UPC WIND MANAGEMENT, LLC
EVERGREEN WIND POWER, LLC
MARS HILL WIND FARM
MARS HILL, MAINE

SOUND LEVEL STUDY

AMBIENT & OPERATIONS SOUND LEVEL MONITORING

2ND QUARTERLY REPORT

Maine Department of Environmental Protection Order No. L-21635-26-A-N

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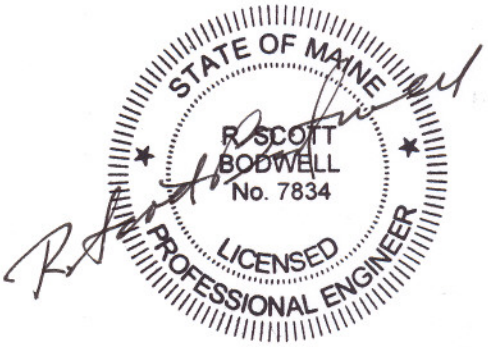
File 030625

NOVEMBER 2, 2007

Resource
Systems
Engineering

ACKNOWLEDGMENTS

Resource Systems Engineering (RSE) wishes to acknowledge the cooperation of area landowners in providing access to sound level monitoring positions in the vicinity of the Mars Hill Wind Farm. RSE also wishes to thank Perkins Engineering, UPC Wind Management, LLC and Evergreen Wind Power, LLC for their assistance during conduct of the second quarterly monitoring activities. RSE personnel responsible for this investigation and report are Charles F. Wallace, Jr., P.E., R. Scott Bodwell, P.E., and Tina J. Jones.



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CONTENTS

APPENDICES*

***Refer to AMBIENT & OPERATIONS SOUND LEVEL MONITORING report by RSE dated June 21, 2007.

LIST OF ACRONYMS

ANSI	American National Standards Institute
dB	Decibel (Unit of Sound Pressure Level)
dBA	Decibel A-weighted
Hz	Hertz (cycles per second)
ISO	International Organization for Standardization
kW	Kilowatt
L_{A1}	Sound Level Exceeded 1% of a Measurement Period (dBA)
L_{A10}	Sound Level Exceeded 10% of a Measurement Period (dBA)
L_{A50}	Sound Level Exceeded 50% of a Measurement Period (dBA)
L_{A90}	Sound Level Exceeded 90% of a Measurement Period (dBA)
L_{Aeq}	Equivalent Sound Level (dBA)
MEDEP	Maine Department of Environmental Protection
mph	Miles per hour
MRSA	Maine Revised Statutes Annotated
MW	Megawatt
RSE	Resource Systems Engineering

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1.0 INTRODUCTION

Resource Systems Engineering (RSE) began the Sound Level Study for the Mars Hill Wind Farm in December 2003 by developing a sound level prediction model for the project. The results of the initial study were submitted to the Maine Department of Environmental Protection (MEDEP) as part of the Site Location of Development Act Application. Subsequently, RSE has measured sound levels in the vicinity of the project site under both ambient and operating conditions. The overall objective of the Sound Level Study is to compare sound levels from operation of the Mars Hill Wind Farm (Wind Farm) with predicted estimates of Wind Farm sound levels and ambient sound levels in the vicinity of the Wind Farm. This report presents the results of the second set of quarterly sound level measurements taken during routine wind farm operations on September 4 and 5, 2007.

Refer to the AMBIENT & OPERATIONS SOUND LEVEL MONITORING report by RSE dated June 21, 2007 for additional details concerning previous portions of the Sound Level Study.

2.0 SOUND AND DECIBELS

Refer to Section 2.0 of the AMBIENT & OPERATIONS SOUND LEVEL MONITORING report by RSE dated June 21, 2007.

3.0 SITE DESCRIPTION

Refer to Section 3.0 of the AMBIENT & OPERATIONS SOUND LEVEL MONITORING report by RSE dated June 21, 2007.

4.0 MEDEP STANDARDS

Refer to Section 4.0 of the AMBIENT & OPERATIONS SOUND LEVEL MONITORING report by RSE dated June 21, 2007.

5.0 SOUND LEVEL MODEL ESTIMATES FOR WIND FARM OPERATION

Refer to Section 5.0 of the AMBIENT & OPERATIONS SOUND LEVEL MONITORING report by RSE dated June 21, 2007.

6.0 AMBIENT SOUND LEVELS

Refer to Section 6.0 of the AMBIENT & OPERATIONS SOUND LEVEL MONITORING report by RSE dated June 21, 2007.

7.0 OPERATING SOUND LEVELS

Refer to Section 7.0 of the AMBIENT & OPERATIONS SOUND LEVEL MONITORING report by RSE dated June 21, 2007 for measurement results from May 2007. The following presents the results of the second set of quarterly sound level measurements from September 2007 routine wind farm operations.

RSE conducted operations sound testing starting the afternoon of September 4, 2007 and continuing until roughly the evening of September 5, 2007. This monitoring period of approximately 28 hours exceeds the minimum 24-hour period prescribed under the sound level monitoring plan approved by MEDEP. (see Appendix I of RSE report of June 21, 2007). Sound levels were measured under varying wind and operating conditions in order to determine by measurement, sound levels at community monitoring positions during routine operation of the Wind Farm. Measured sound levels are compared to ambient sound levels and predicted sound levels of Wind Farm operation provided to the MEDEP as part of the Site Permit application.

As noted in the AMBIENT & OPERATIONS SOUND LEVEL MONITORING report by RSE dated June 21, 2007, the predicted sound levels were based on operation of 35 wind turbines compared to the 28 wind turbines operating in the as-built configuration of the Wind Farm. Six of the possible locations where wind turbines were not erected are near the north end of the Wind Farm and over 3,000 feet west of the as-built turbine locations. The seventh possible location is also toward the north end and approximately 1,200 feet west of as-built turbines. A review of these possible turbine sites relative to the sound level prediction model indicates that operation of the seven additional wind turbines would provide a minimal sound level contribution to the monitoring positions. This finding is based on the closer proximity of multiple wind turbines to monitoring positions.

7.1 Measurement Procedures

To the extent practicable, measurements were conducted in accordance with MEDEP Chapter 375.10 Section H.4, Measurement of Sound from Routine Operation of Developments. Consequently, a primary objective is to measure Wind Farm sound levels at nearby protected locations during conditions when the sound from the Wind Farm is most noticeable. This requires ample wind speeds at higher elevations for the wind turbines to operate at or near full power with less wind at the lower elevation, community monitoring positions. These conditions occurred for the majority of the evening and overnight hours of the measurement period.

Based on their proximity to wind turbines and accessibility, nine monitoring positions were originally selected for measurement to represent protected locations in the vicinity of the Wind Farm. The monitoring positions are either within the boundaries of the Wind Farm or permission to conduct measurements was granted by the landowner. Of the original nine measurement positions, two were discontinued (MP-3 and MP-6) and one (MP-7) was relocated nearby to a new position (MP-7A) to address landowner considerations. Positions MP-3 and MP-6 were discontinued as these positions are generally represented by other nearby monitoring positions (MP-6A and MP-4A). Wind noise in pine trees close to MP-6 more frequently masked turbine noise than at MP-6A. Figure 7-13 provides a map of the monitoring positions used during both ambient and operations sound level testing. The following provides a description of monitoring positions utilized during operations sound level testing and provides a distance to the nearest wind turbine:

Position	Description
MP-1*	Property line of the Wind Farm and abutting residential parcel off East Ridge Road at the north end of the Wind Farm. MP-1 is approximately 800 feet west of turbine nos. 1 and 2.
MP-2*	Along the main Wind Farm access road and nearby a residential parcel off East Ridge Road and west of the Wind Farm. MP-2 is approximately 5900 feet west of turbine no. 17.
MP-3	At the base of Big Rock Ski Area and at the residential lot within the Big Rock Subdivision nearest to the Wind Farm. MP-3 is approximately 3400 feet west of turbine no. 28.
MP-4A*	Relocation of ambient position MP-4 approximately 2000 feet east toward the Wind Farm. Near golf course hole no. 12 approximately 3250 feet west of turbine no. 22.
MP-5*	At a residential property along Mountain Road east of the southern portion of the Wind Farm . MP-5 is approximately 3400 feet east of turbine no. 19.
MP-6	Residential parcel near the north end of Mountain Road and to the east of the Wind Farm. MP-6 is approximately 2050 feet east of turbine no. 6.
MP-6A*	Approximately 1200 feet south of position MP-6 and 2100 feet east of turbine no. 7.
MP-7	Near residential parcel off Mountain Road approximately 2500 feet east of turbine no. 11.
MP-7A*	Located near center of residential parcel off Mountain Road and approximately 2,500 feet east of turbine no. 12. Replaced position MP-7 for second quarterly operations sound level testing.
MP-8*	Near property line an abutting residential parcel off East Ridge Road at the north end of the Wind Farm. Approximately 1200 feet east of turbine nos. 1 and 2.

*Positions utilized for 2nd Quarterly Operations Sound Level Testing

Sound measurement instrumentation consisted of five Larson-Davis (LD) Model 812 Integrating Sound Level Meters, one LD Model 824 Sound Level Meter/Real-Time Analyzers, one CEL 593 Sound Level Analyzer, and one LD Model 831 Sound Level Meter/Real-Time Analyzer. The LD 812s, the LD 824 and the CEL 593 were used for continuous sound level measurements at the seven community monitoring positions. In addition to overall broadband sound levels, the LD 824 and CEL 593 measure one-third octave band levels. The LD 831 was used to conduct spot measurements at the positions on a rotating basis. The sound level meters meet Type 1 (precision) performance requirements of American National Standard Specification for Sound Level Meters, ANSI S1.4-1983. The microphones were fitted with standard windscreens and mounted on tripods at a height of approximately five feet above the ground. The sound level meters were calibrated before and after the monitoring period. Additionally, a certified laboratory performs a calibration with 12 months of the measurement period.

In an effort to provide localized data, measurements of surface weather conditions were recorded using portable meteorological (MET) stations at five of the seven monitoring positions. The MET stations were mounted on tripods and located within 50 feet of the monitoring positions to record "surface" conditions. RainWise Portable Weather Logger (PortLog) stations were deployed at positions MP-1, MP-5, MP-6A and MP-7A and a Casella Nomad Portable Weather Station was deployed at position 4A. Among other data, the PortLog MET stations were programmed to record temperature, humidity, wind speed and direction every two seconds and averaged these readings over 10-minute periods. The Nomad was programmed to record similar data every 60 seconds with no data averaging. Wind data was measured at a height of 8 to 10 feet above grade. Wind direction data recorded by the PortLog stations was inaccurate due to a firmware malfunction.

Sound levels were simultaneously measured at all seven monitoring positions over a period of approximately 28 hours representing a range of weather and Wind Farm operating conditions. Over this period, sound levels were measured every 1/8 second to record both short-term and hourly statistics at each position. A project engineer and field technician recorded field observations and weather

conditions, and measured one-third octave band sound levels at each monitoring position on a rotating basis. Field observations supplement sound level data to determine the primary contributors to the measured sound levels. These contributors included sound from wind turbines and non-Wind Farm sources such as wind sound, wind-induced sound from trees, road traffic, residential activity, aircraft traffic and natural sounds such as crickets, insects and birds.

UPC Operations recorded operating and meteorological data from each turbine every ten seconds and reported the average readings at ten-minute intervals. Data includes power production, hub height wind speed and direction, and rotor rpm. Graphs showing power production and wind speed data for each wind turbine can be found in Appendix III.

The following describes the measurement results, field observations, Wind Farm operating data, and meteorological data recorded during the measurement period at each monitoring position.

7.2 Measurement Results

During the 28-hour test period, sound levels were measured under a range of wind and operating conditions. Wind turbine operating levels varied from full power production during periods of strong wind to low power production during periods of light or calm winds. The highest wind speeds at the turbine hubs and consequently turbine operations occurred for approximately 12 hours during the overnight period. During this period, winds were from the west/northwest and typically ranged from 10 to 12 meters/second (22 to 28 mph) at the turbine hubs. At the same time surface winds diminished and were relatively light at the monitoring positions.

To provide an overview of Wind Farm operations during the monitoring period, Figure 7 presents a graph showing the overall average power production of the Wind Farm, average wind speed at the turbine hubs, and surface wind speed (ref. Northern Maine Regional Airport, Presque Isle, Maine; www.wunderground.com).

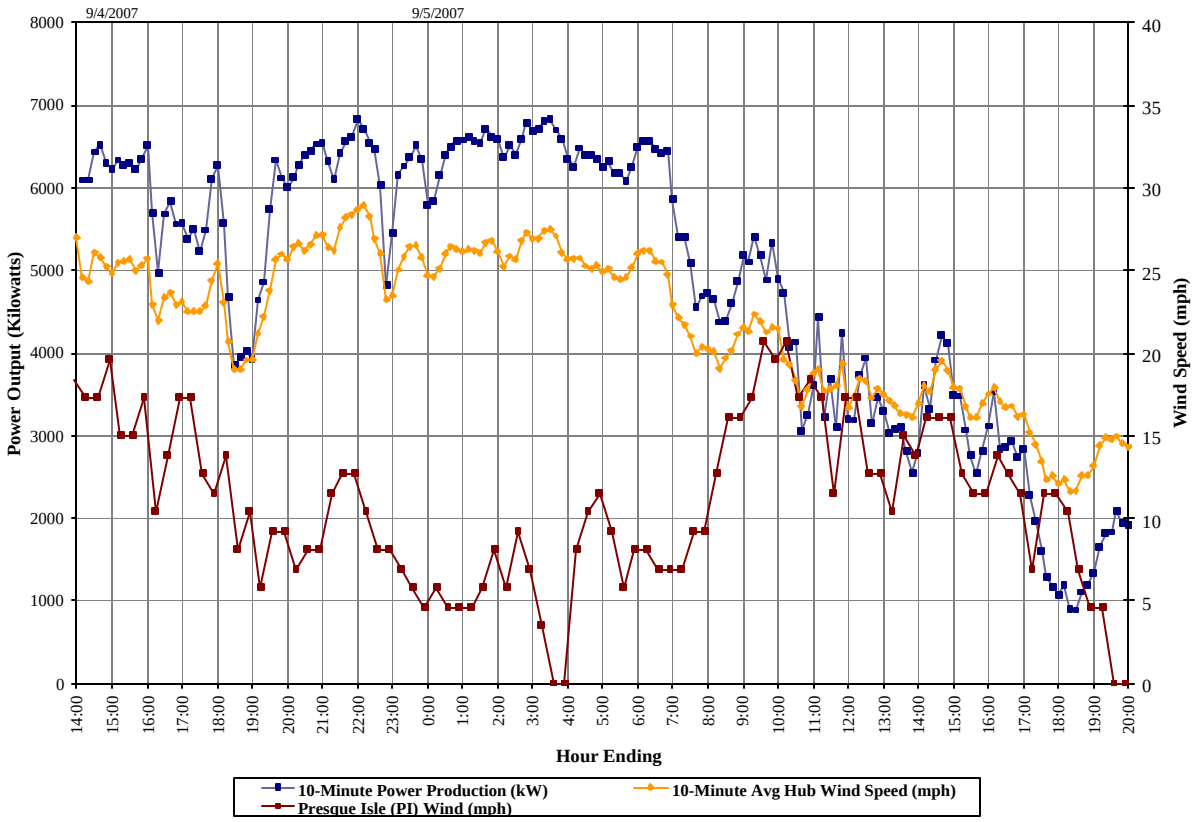
The airport in Presque Isle measures wind speed and direction in an open area at a height of 30 feet above ground and represents general surface wind conditions in the vicinity of Mars Hill. Wind direction was taken from this data and field observations. Additional wind speed data recorded at sound level monitoring positions using portable meteorological stations is presented in subsequent figures along with sound level measurement results. Each data point represents a ten minute period of Wind Farm operation. Electric power production is presented in kilowatts (kW). With all 28 turbines operating at full load, the Wind Farm has the capacity to generate 7,000 kW of electric power during a 10-minute period.

To determine the sound level contribution of the Wind Farm alone, ambient non-Wind Farm sound must be subtracted from measured sound levels at each position. During 2nd quarterly testing, the most prominent ambient sound was the action of wind on leaves at or near the tops of nearby trees. Other sounds include wind-induced sound, crickets, birds and local traffic. Much like the sound from wind turbines, wind-induced sound also changes with wind conditions. Shielding from vegetation and terrain varies with wind direction and gradients, and can fluctuate significantly over brief periods due to wind gusts and flow patterns around the ridge.

Compared to wind data from the Presque Isle airport and wind turbine hubs, surface wind speeds at the five portable MET stations generally showed minor fluctuations, particularly when averaged over a 10-minute period. This would be expected since these monitoring positions were purposely located at points partially shielded from wind by vegetation or terrain in order to reduce the contribution of non-wind turbine sound. A wider range of wind speeds was reported at MP-4A where one-minute readings (without averaging) were taken. Even though the range of wind speeds was lower, wind speeds at the monitoring positions trended higher and lower during the same periods as data reported from the

Presque Isle airport. Located in an open, elevated farm field, wind speeds at MP-2 would likely be similar to readings from Presque Isle.

Figure 7. Wind Farm Power Generation, Average Turbine Wind Speed, and Surface Wind Speed



A primary objective of continuously measuring wind speed at the monitoring positions was to determine the presence and contribution of non-turbine wind-induced sound to the measured sound levels. Field observations indicate that due to full leaf out conditions, the majority of wind-induced sound resulted from wind near treetops at heights well above both the tripod-mounted microphones and anemometers. Consequently, when the contribution of non-turbine, wind-related sound increased, there was little, if any change, in the 10-minute average wind speed data from the portable MET stations. For example, at position MP-1 when field observations indicate both wind turbine and wind-induced sound contributed to the measured sound levels during daytime hours on September 5, wind speed readings from the portable MET station did not increase. Due to its close proximity and similar terrain features, wind speed and direction at MP-8 are expected to be relatively consistent with readings taken at MP-1.

From local and airport surface wind data, field observations and sound level measurements, the most significant periods of non-turbine, wind-induced sound occurred during daytime hours on both September 4 and September 5. Measured sound levels from these daytime periods, include significant contributions from both wind turbines and wind on trees as the most prominent source of non- turbine ambient sound. During the nighttime period, surface wind speeds diminished to light or calm, while wind speeds aloft increased considerably resulting in operation of the Wind Farm at or near full power production.

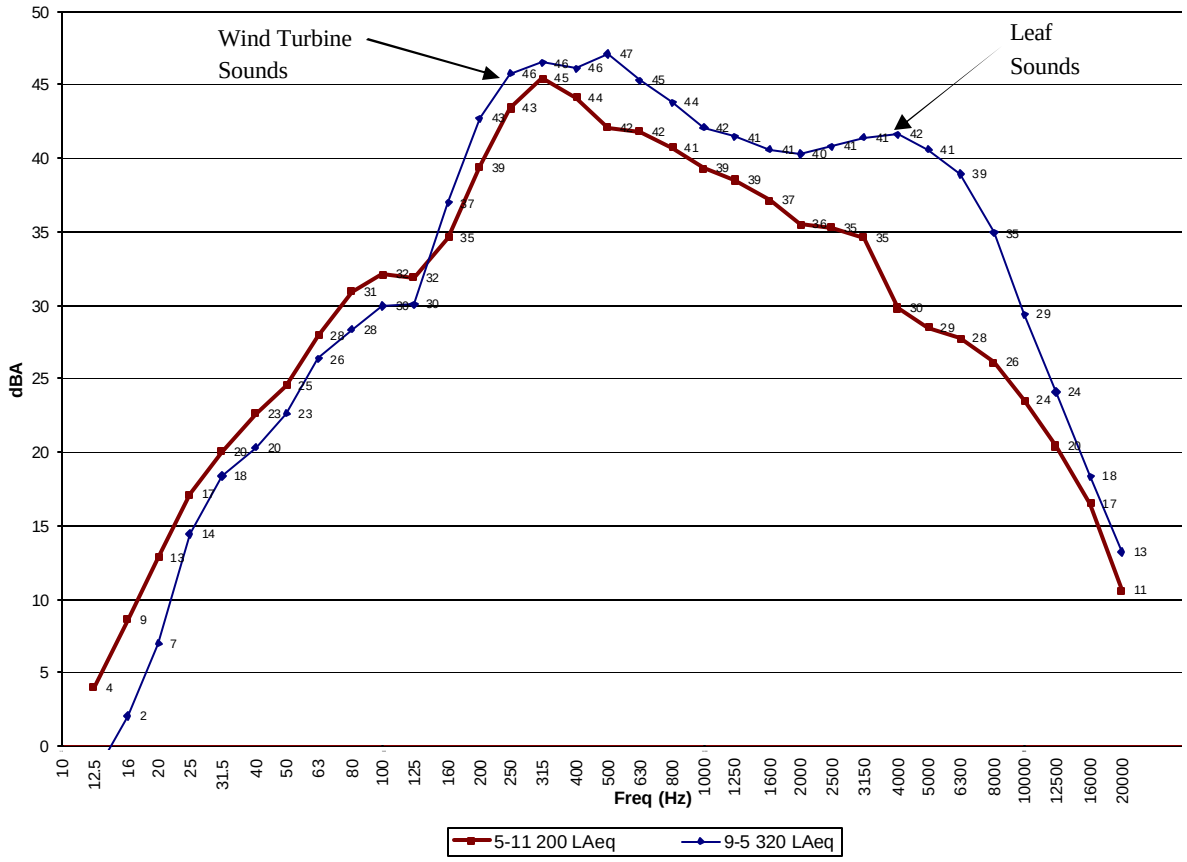
At most monitoring positions, nighttime sound levels during near full operation of the Wind Farm were generally lower than daytime sound levels when surface winds increased and the Wind Farm was

generating less power. Observations indicate that the higher daytime sound levels were attributable to wind-produced leaf sounds in the trees. Because the surface MET stations, like the monitoring positions, are partially shielded from wind that can generate wind-related sounds, it would be difficult to establish a relationship between non-turbine, ambient sound levels and measured wind speed at the monitoring position. In the future, for conditions similar to those experienced during the 2nd quarterly testing, it may be possible to establish this relationship by recording wind speed data at the height of nearby treetops, however this was not done in this instance and the data recorded did not prove to be useful for making a correction for non-turbine, wind-induced sound levels. Wind speed data from the MET stations indicate that wind speeds during the overnight period were below the 12 mph threshold established for sound level measurements by Maine DEP 375.10.H.2.4.

For 1st quarterly testing prior to leaf out in May 2007, contributions of wind related sounds were difficult to identify due to varying surface winds and similarities between these sources and the frequency spectra of Wind Farm sound. Analysis of A-weighted, third-octave band sound levels from 2nd quarterly testing with full leaf out show more prominent leaf sounds in higher frequencies ranging from 2000 to 6300 Hz. Field observations indicate increased audibility of these leaf sounds relative to wind turbines as a result of the more prominent higher frequencies. Ambient sound contributions in lower mid-range frequencies (200 to 800 Hz) similar to wind turbine sounds were not as evident and thus these sound levels may not be attribute to a single source. To remain conservative, ambient sound levels used to adjust 2nd quarterly nighttime measurements remain consistent with 1st quarter results. An example of A-weighted third octave band sound levels measured at MP-1 for 1st and 2nd quarterly testing is presented as Figure 7-1 and shows the contribution of leaf sounds at higher frequencies.

The contribution of ambient sound levels during 2nd quarterly testing is estimated from typical hourly L_{Aeq} readings during periods of the May 2007 operations testing when winds were light or calm and wind turbines were not operating. This is a very conservative approach to estimating ambient sound levels that are likely to occur during periods of significant Wind Farm operation Sound level monitoring results and field observations from December 2006, May 2007 and September 2007 indicate that ambient sound levels during wind conditions required for significant Wind Farm operation are generally higher than estimated by this method.

Figure 7-1. Comparison of Third Octave Band Sound Levels (dBA) at MP-1 for 1st and 2nd Quarterly Sound Testing



Figures 7-2 through 7-8 present measured hourly L_{Aeq}, L_{A50}, and L_{A90} readings at each position in relation to the average power output of nearby wind turbines, the average wind speed at the hub of the nearest or nearby turbine, and surface wind speeds. Surface wind speeds include area data (Presque Isle Airport) and measurements from portable meteorological stations at the sound level monitoring positions. MEDEP regulations are based on the L_{Aeq} parameter which includes all sound energy from wind turbine and other sound sources such as wind, birds, and crickets. Field observations and measurements suggest that the L_{A50} and L_{A90} parameters can be used to identify periods with lower contributions of non-wind turbine sounds. These parameters also provide a statistical approximation of overall wind turbine sound levels. Appendix IV contains tables and graphs of sound level measurements during Wind Farm operations. The readings include hourly L_{Aeq}, L_{A1}, L_{A10}, L_{A50} and L_{A90} values for each measurement position. Figures 7-9 through 7-12 present measured hourly L_{Aeq} and L_{A90} readings at selected pairs of measurement positions that have similar wind conditions and nearby turbine operations. When measurement results show that sound level fluctuations at similar positions do not coincide, periods of sound contributions from non-Wind Farm sources (*e.g.*, wind, mowing, crickets and birds) are likely to have occurred. Field observations at similar positions were also compared to determine the relative contributions of various sound sources.

The overall A-weighted sound level measurements, as presented in Figures 7-2 through 7-12, were supplemented with measurements of one-third octave band (third octave) sound levels and field observations by RSE personnel. At positions MP-1 and MP-7A, third octave levels were measured on a continuous basis throughout the 2nd quarterly monitoring period. At other positions, third octave levels

were measured on a rotating basis coinciding with field observations. Appendix V contains a series of graphs presenting third octave sound level measurements at each monitoring position. In addition to third octave sound levels, each graph provides the overall A-weighted sound level, a summary of field observations, and turbine power production and wind speed data.

The results presented in Figures 7-2 through 7-12, third octave sound level measurements (Appendix V), and field observations were used to determine the contribution of turbine sound levels at each monitoring position and evaluate the presence of short duration repetitive sounds. Measurements of third octave sound levels and field observations were also used to determine the presence of tonal sounds from the Wind Farm. An evaluation of short duration repetitive and tonal sounds in accordance with MEDEP 375.10 can be found in Section 7.2.

Field observations and measurements indicate that during periods when the difference between the L_{Aeq}, L_{A50} and L_{A90} readings were small, sound from the Wind Farm was a primary source at the monitoring positions. To calculate the wind farm sound level at each position, the estimated ambient sound level from non-Wind Farm sounds based on May 2007 readings was subtracted from measured L_{A50} sound level readings for these periods. To remain conservative, exceptions occurred at MP-2 and MP-4A where May 2007 ambient sound levels were close to or higher than 2nd quarterly operating sound levels due to seasonal changes in ambient sources. As a result, it is likely that the sound contribution due to Wind Farm operation has been over-estimated in some cases, despite the correction for ambient.

Figure 7-2. Sound Levels at MP-1 in Relation to Wind Turbine Power Output and Wind Speed

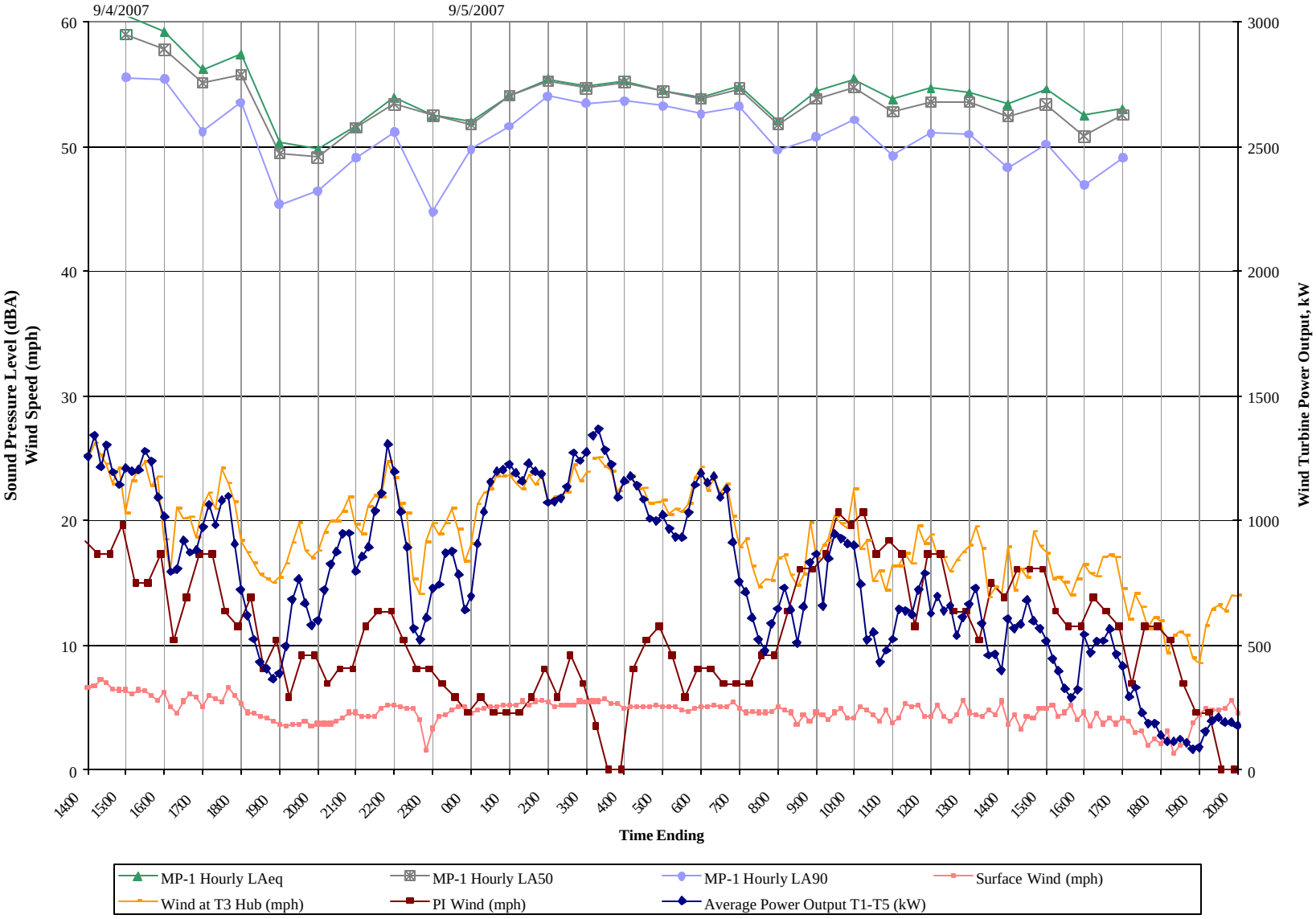


Figure 7-3. Sound Levels at MP-2 in Relation to Wind Turbine Power Output and Wind Speed

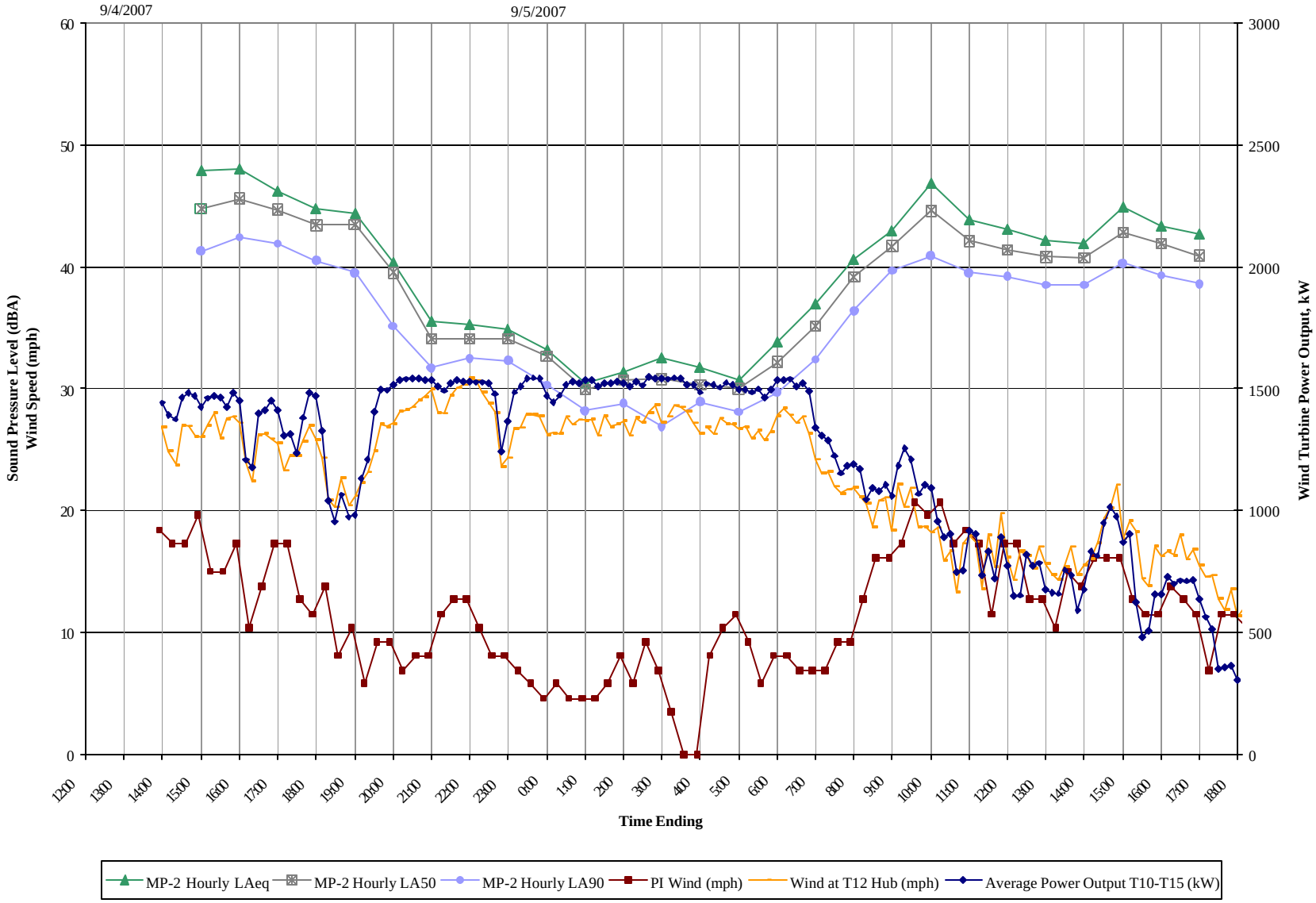


Figure 7-4. Sound Levels at MP-4A in Relation to Wind Turbine Power Output and Wind Speed

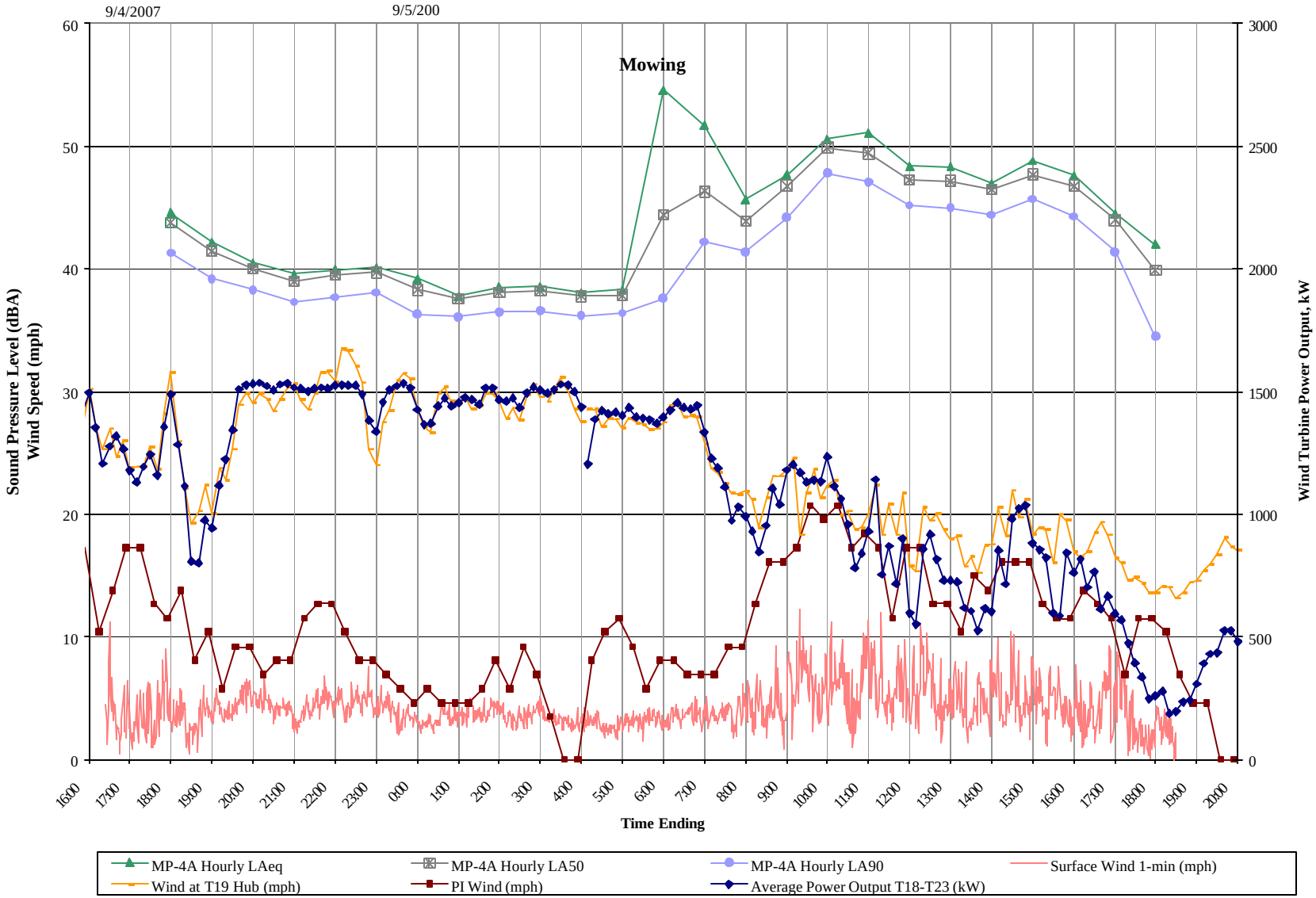


Figure 7-5. Sound Levels at MP-5 in Relation to Wind Turbine Power Output and Wind Speed

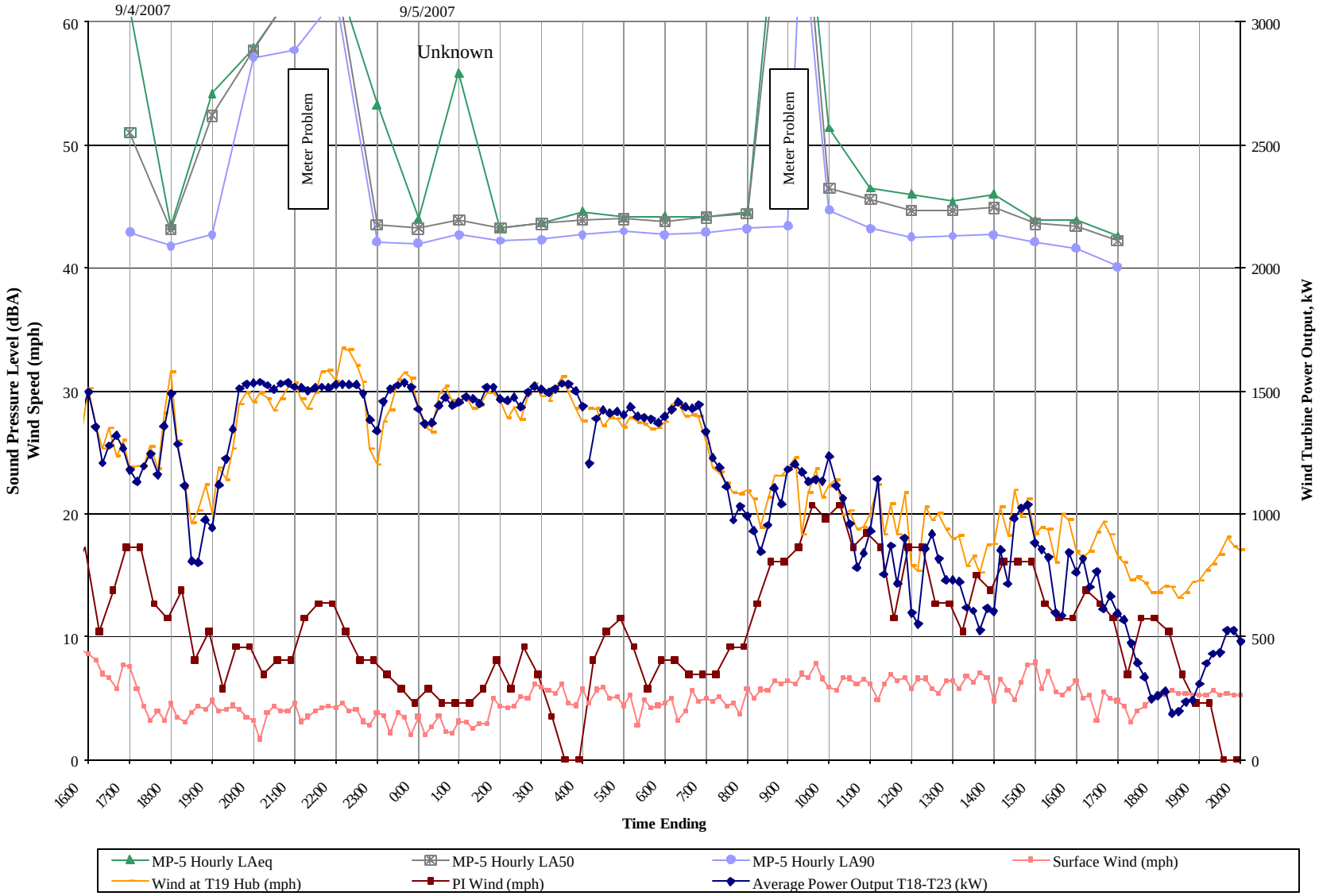


Figure 7-6. Sound Levels at MP-6A in Relation to Wind Turbine Power Output and Wind Speed

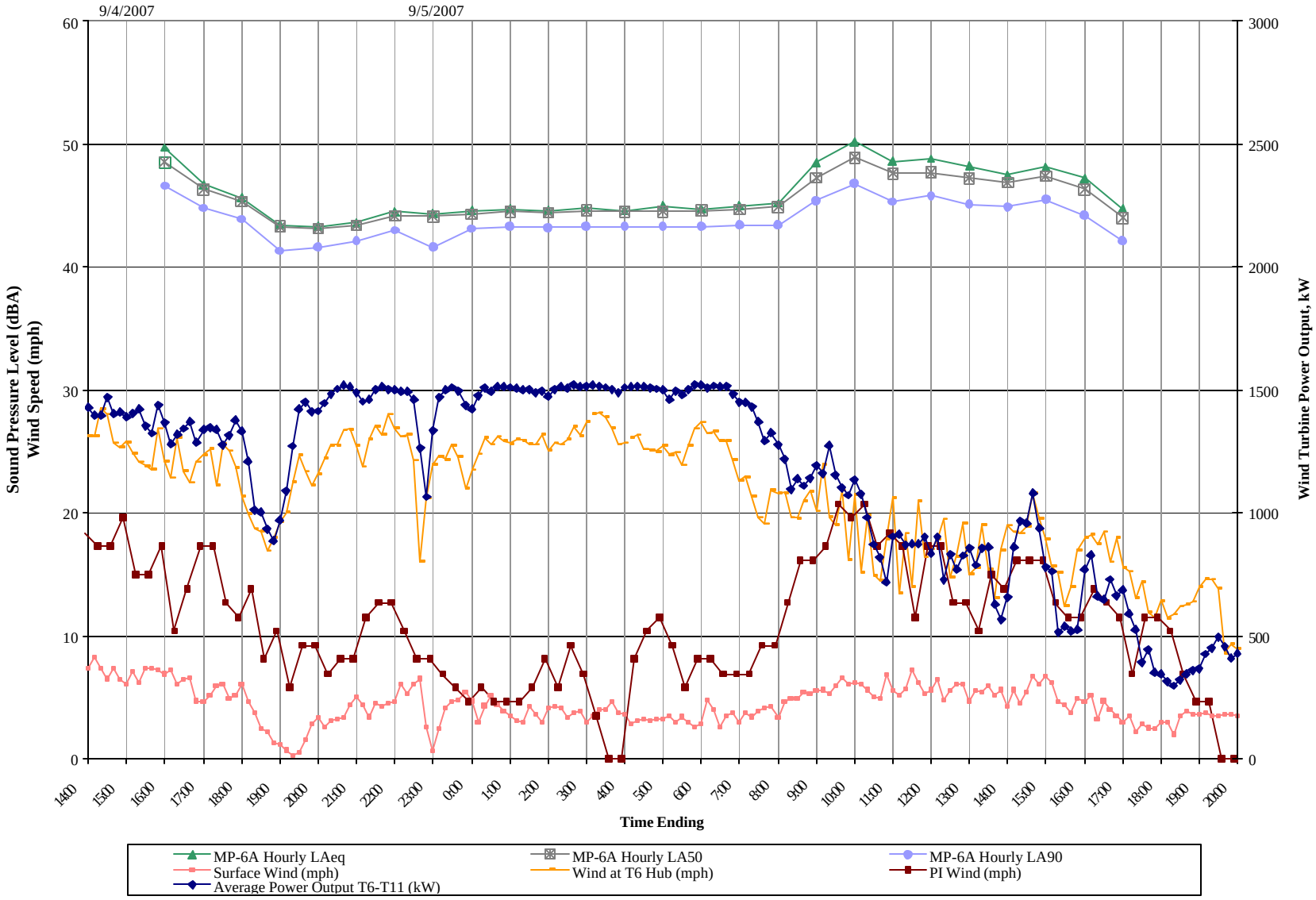


Figure 7-7. Sound Levels at MP-7A in Relation to Wind Turbine Power Output and Wind Speed

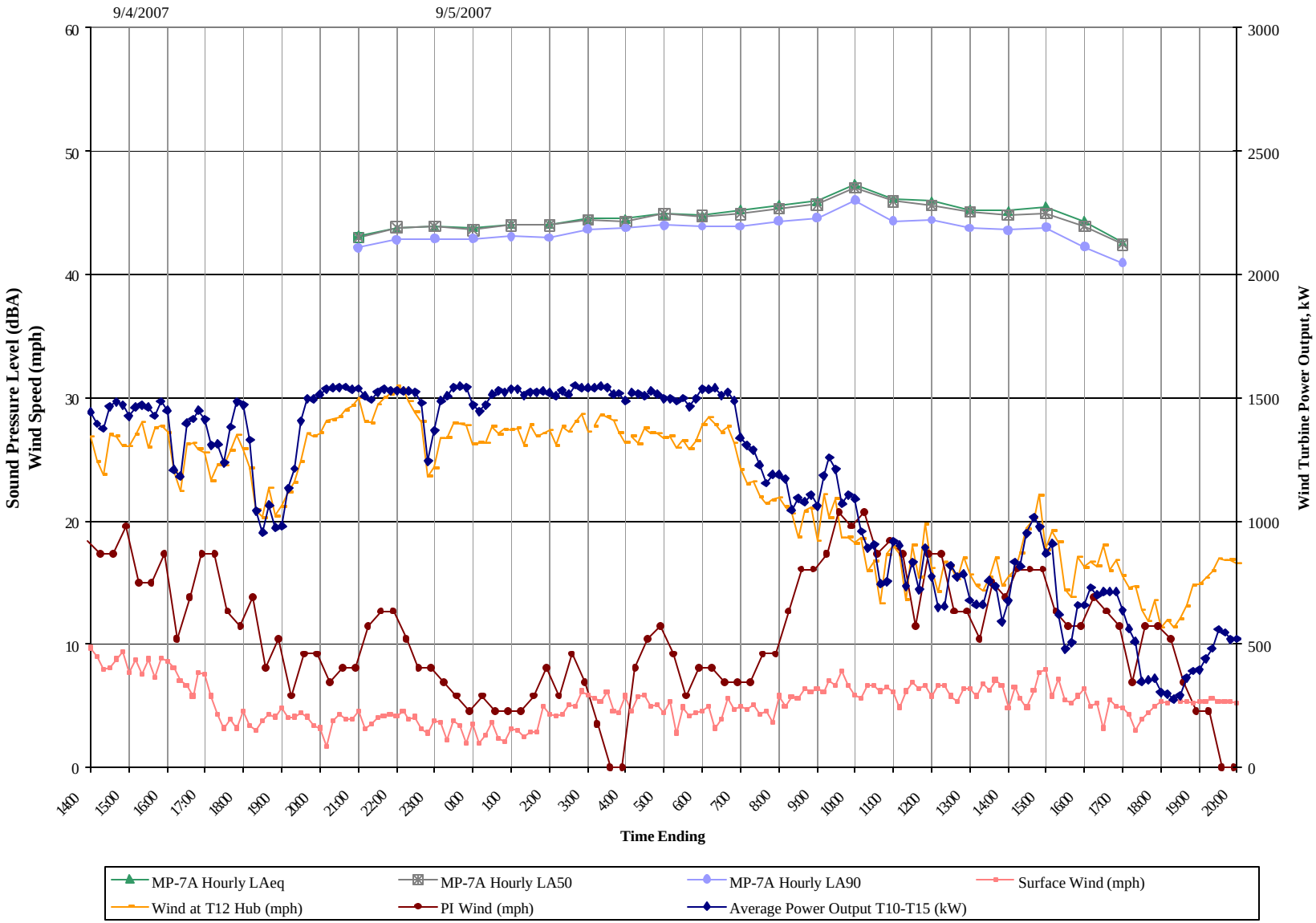


Figure 7-8. Sound Levels at MP-8 in Relation to Wind Turbine Power Output and Wind Speed

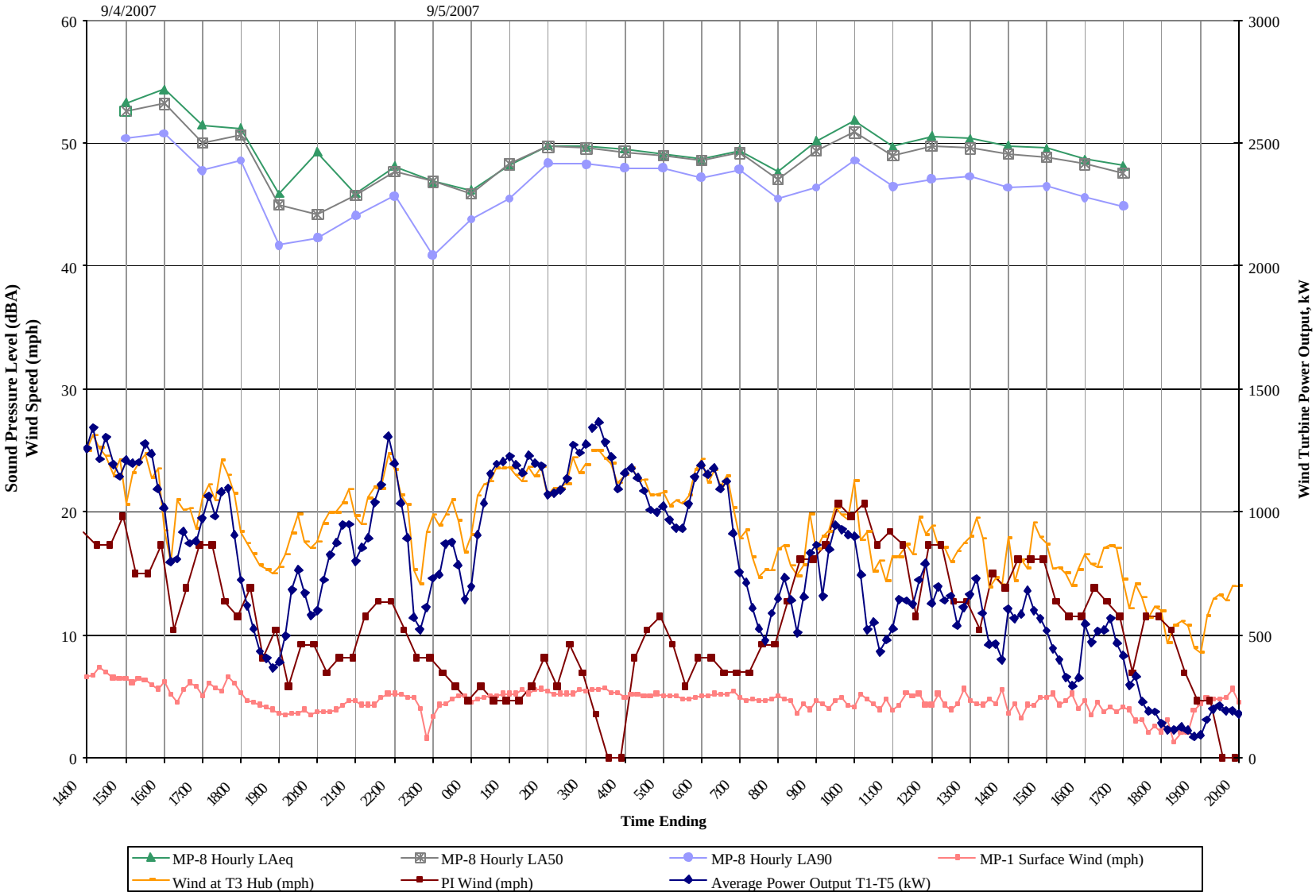


Figure 7-9. Sound Levels at MP-1 and MP-8 in Relation to Wind Turbine Power Output and Wind Speed

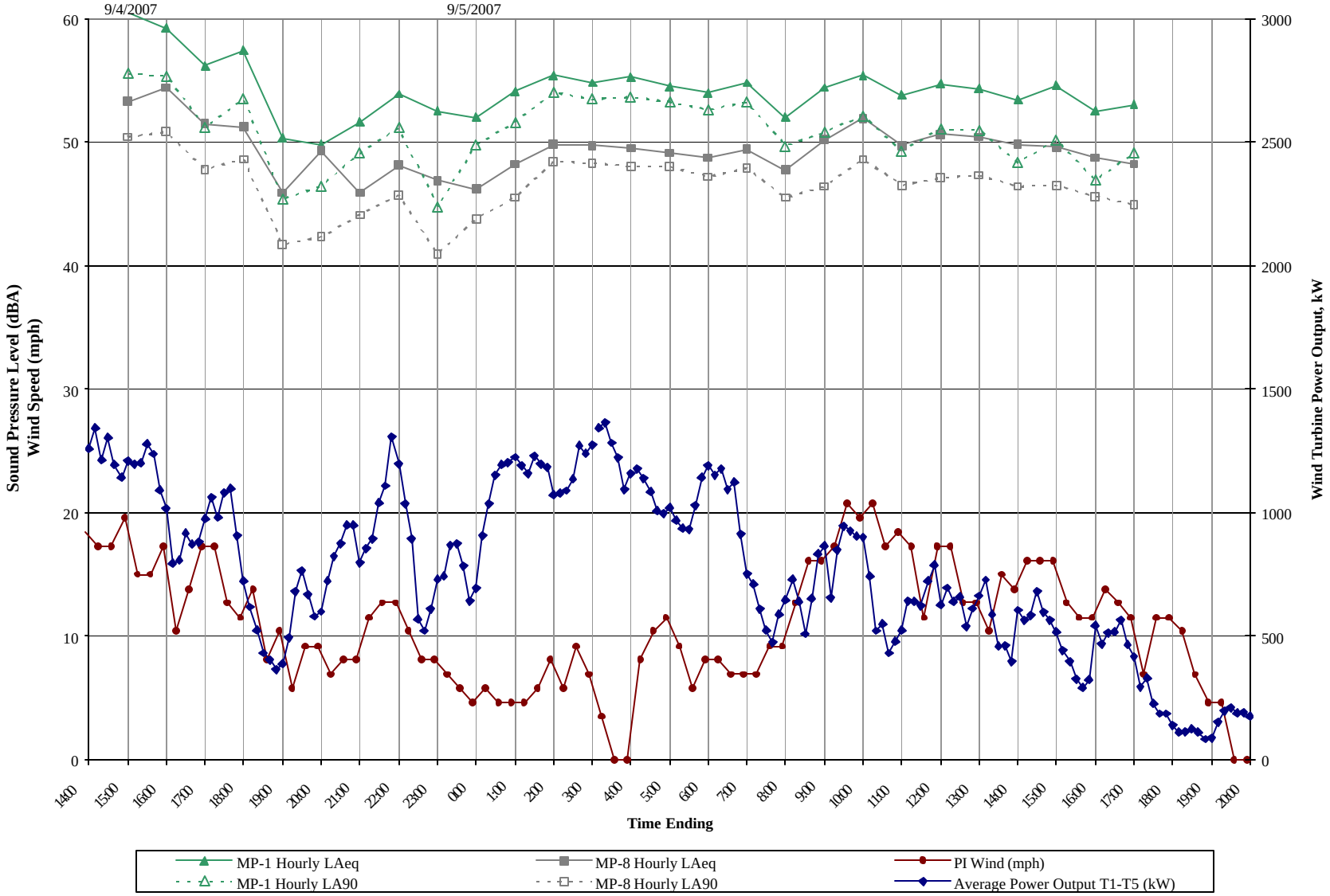


Figure 7-10. Sound Levels at MP-6A and MP-7A in Relation to Wind Turbine Power Output and Wind Speed

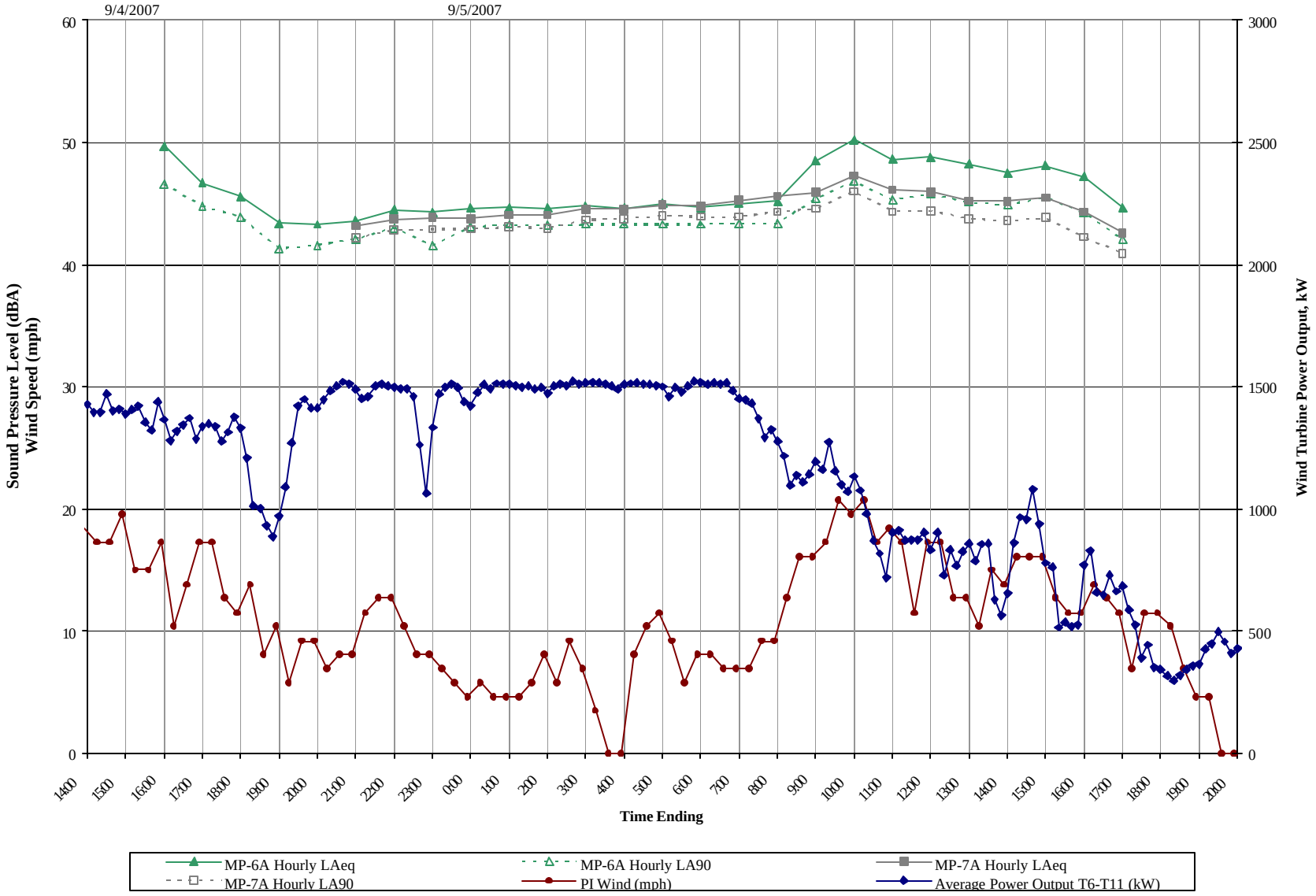


Figure 7-11. Sound Levels at MP5 and MP-7A in Relation to Wind Turbine Power Output and Wind Speed

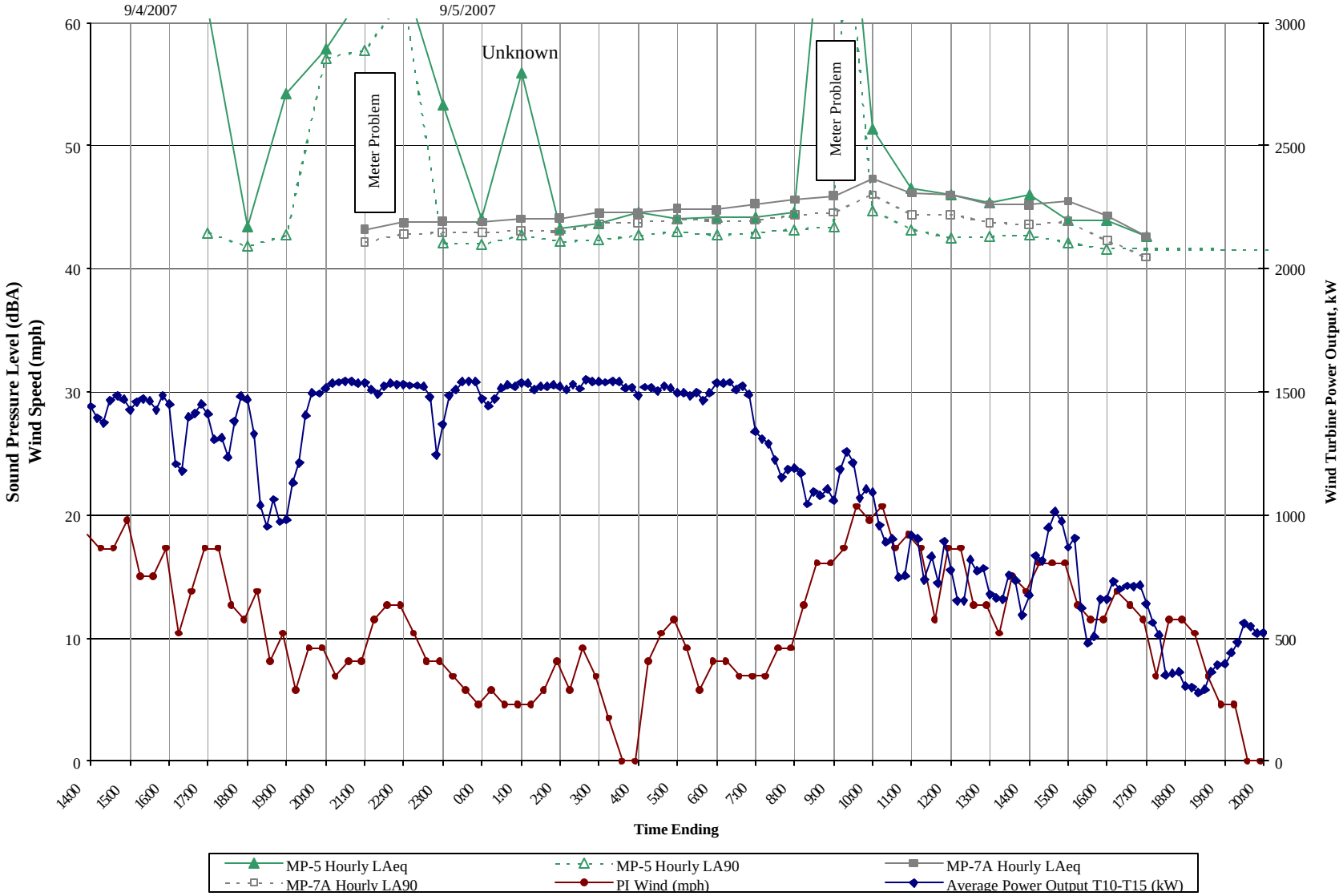
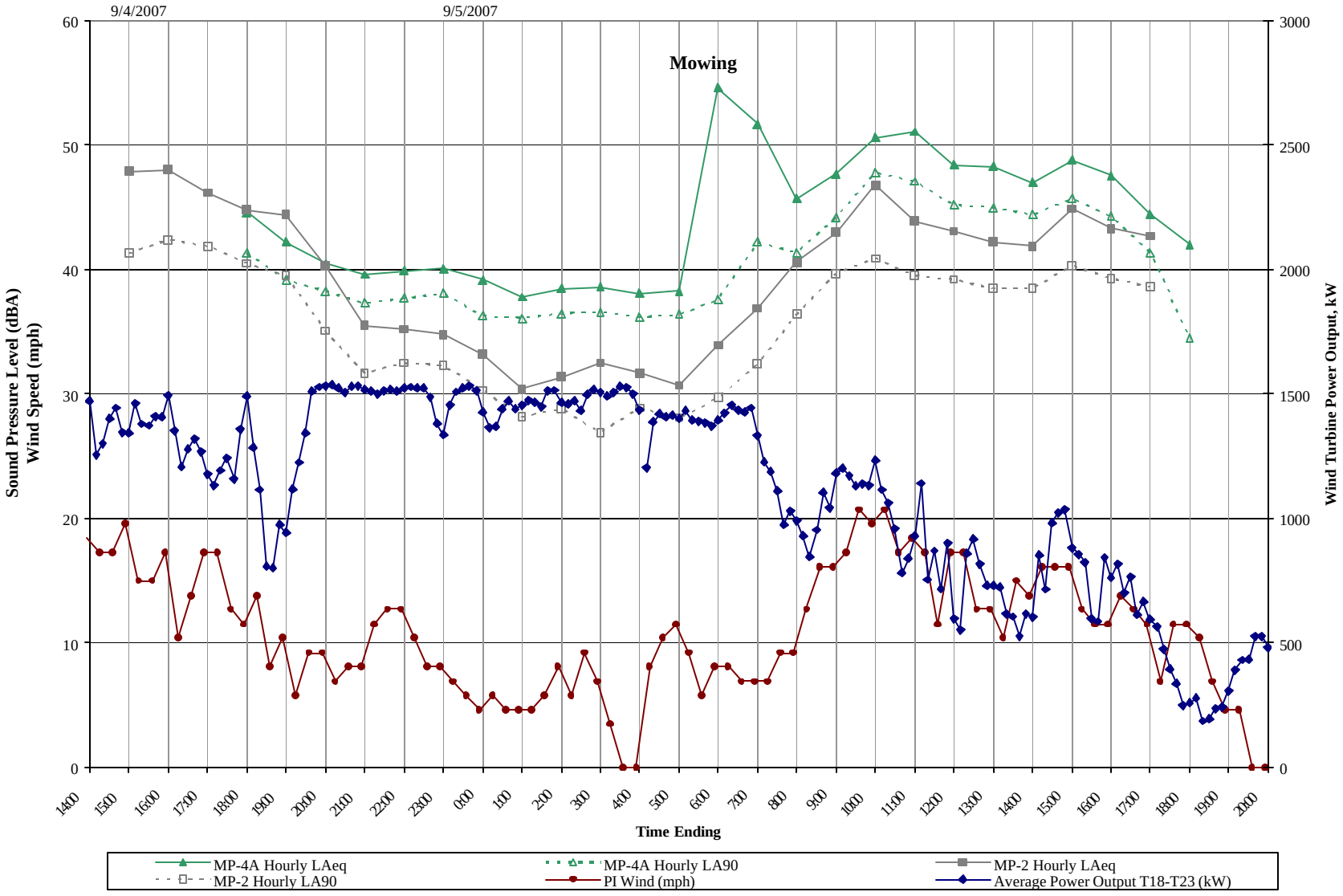


Figure 7-12. Sound Levels at MP-2 and MP-4A in Relation to Wind Turbine Power Output and Wind Speed



The following provides a summary of operating conditions and measurement results at each monitoring position and comparisons of operations test data with first quarterly sound test results and sound level model estimates.

At Position MP-1 hourly sound levels from representative second quarterly nighttime Wind Farm operations ranged from 53 to 55 dBA with NW wind and 75 to 90% output from nearby turbines. During the first quarterly sound test Wind Farm sound levels ranged from 47 to 51 dBA with SW wind and near full operations, ranged from 48 to 52 with SE wind and variable operation (50 to 75% power output) and 42 to 47 dBA with NNW wind and nearby power output of 50 to 60%. The estimated contribution of ambient, non-Wind Farm sounds was 40 dBA. Sound level model estimates at this location were 51 dBA at 95% operation. Ambient sound levels measured at MP-1 in December 2006 ranged from 33 to 56 dBA with higher readings noted during daytime periods and when wind speeds increased.

At Position MP-2 hourly sound levels from representative second quarterly nighttime Wind Farm operations ranged from 30 to 31 dBA with NW wind and 100% output from nearby wind turbines. During the first quarterly sound test Wind Farm sound levels were approximately 30 dBA with SW wind and near full operations, could not be isolated from non-turbine sound sources with SE wind and variable operation (50 to 75% power output) and were 36 dBA with NNW wind and power output of 75 to 100%. The estimated contribution of ambient, non-Wind Farm sounds was 30 dBA. Sound level model estimates at this location were 35 dBA at 95% operation. Ambient sound levels measured at MP-2 in December 2006 ranged from 28 to 60 dBA with higher readings noted during daytime periods and when wind speeds increased.

Second quarterly sound testing was not conducted at Position MP-3. Hourly sound levels from representative first quarterly Wind Farm operations were approximately 30 dBA with SW wind and near full operations, 33 dBA with SE wind and variable operation (50 to 75% power output) and 37 dBA with NNW wind and power output of 75 to 100%. The estimated contribution of ambient, non-Wind Farm sounds was 31 dBA. Sound level model estimates at this location were 36 dBA at 95% operation. Ambient sound levels measured at MP-3 in December 2006 ranged from 35 to 51 dBA with higher readings noted during daytime periods and when wind speeds increased.

At Position MP-4A hourly sound levels from representative second quarterly nighttime Wind Farm operations ranged from 38 to 40 dBA with NW wind and 95 to 100% output from nearby wind turbines. No adjustment was made for the contribution of ambient sound levels. During the first quarterly sound test Wind Farm sound levels were difficult to isolate from other sound sources due to frogs and wind. A possible exception was with NNW wind and power output of 75 to 100% when wind farm sound levels were approximately 37 dBA compared with sound level model estimates of 37 dBA at this location during 95% operation. The estimated contribution of ambient, non-Wind Farm sounds for the first quarterly sound test was 34 dBA. Ambient sound levels at MP-4A are represented by measurements at MP-4 where hourly L_{Aeq}s ranged from 29 to 59 dBA with higher readings noted during daytime periods and when wind speeds increased.

At Position MP-5 hourly sound levels from representative second quarterly nighttime Wind Farm operations ranged from 43 to 44 dBA with NW wind and 90 to 100% output from nearby wind turbines. During the first quarterly sound test Wind Farm sound levels were difficult to isolate from other sound sources due to sounds from frogs and wind. With SW wind and near full operations, RSE observed approximately equal contributions from wind turbines and non-Wind Farm sources. With combined sound levels of 42 to 43 dBA, this would result in a sound level from the Wind Farm of 39 to 40 dBA. With SE wind and variable operation (50 to 75% power output) Wind Farm sound levels were the predominant sound source measuring 39 dBA. Sound level model estimates at this location were 39 dBA during 95% operation. The estimated contribution of ambient, non-Wind Farm sounds was 34

dBA. Ambient sound levels measured at MP-5 in December 2006 ranged of 30 to 53 dBA with higher readings noted during daytime periods and when wind speeds increased.

Second quarterly sound testing was not conducted at Position MP-6. Hourly sound levels from representative first quarterly Wind Farm operations ranged from 44 to 45 dBA with SW wind and near full operations, ranged from 42 to 45 with SE wind and variable operation (50 to 75% power output) and 38 to 41 dBA with NNW wind and nearby power output of 50 to 75%. The estimated contribution of ambient, non-Wind Farm sounds was 33 dBA. Sound level model estimates at this location were 43 dBA at 95% operation. Ambient sound levels measured at MP-6 in December 2006 ranged from 27 to 55 dBA, with higher readings noted during daytime periods and when wind speeds increased.

At Position MP-6A hourly sound levels from representative second quarterly Wind Farm operations ranged from 43 to 45 dBA with NW wind and 90 to 100% output from nearby turbines. During the first quarterly sound test Wind Farm sound levels ranged from 42 to 44 dBA with SW wind and near full operations and with SE wind and variable operation (50 to 75% power output), and ranged 38 to 40 dBA with NNW wind and nearby power output of 50 to 75%. The estimated contribution of ambient, non-Wind Farm sounds was 33 dBA. Sound level model estimates at this location were 42 dBA at 95% operation. Ambient sound levels at MP-6A are represented by MP-6 where hourly L_{Aeqs} measured in December 2006 ranged from 27 to 55 dBA, with higher readings noted during daytime periods and when wind speeds increased.

At Position MP-7A hourly sound levels from representative second quarterly Wind Farm operations ranged from 43 to 45 dBA with NW wind and 90 to 100% output from nearby wind turbines. During the first quarterly sound test Wind Farm sound levels at MP-7 ranged from 43 to 44 dBA with SW wind and near full operations, ranged from 42 to 43 with SE wind and variable operation (50 to 75% power output) and 39 to 40 dBA with NNW wind and nearby power output of 75 to 100%. The estimated contribution of ambient, non-Wind Farm sounds was 32 dBA. Sound level model estimates at MP-7A were 41 dBA and at MP-7 were 40 dBA at 95% operation. Ambient sound levels measured at MP-7 in December 2006 are represented by nearby measurements at MP-5 ranging from 30 to 53 dBA and MP-6 ranging from 27 to 55 dBA, with higher readings noted during daytime periods and when wind speeds increased.

At Position MP-8 hourly sound levels from representative second quarterly Wind Farm operations ranged from 48 to 50 dBA with NW wind and 75 to 90% output from nearby wind turbines. During the first quarterly sound test Wind Farm sound levels ranged from 47 to 50 dBA with SW wind and near full operations, ranged from 46 to 50 with SE wind and variable operation (50 to 75% power output) and 41 to 47 dBA with NNW wind and nearby power output of 50 to 60%. The estimated contribution of ambient, non-Wind Farm sounds was 39 dBA. Sound level model estimates at this location were 47.5 dBA at 95% operation. Ambient sound levels at MP-8 are represented by measurements at nearby MP-1, where hourly L_{Aeqs} measured in December 2006 ranged from 33 to 56 dBA with higher readings noted during daytime periods and when wind speeds increased.

An overall results summary for the first quarterly sound test is presented in Table 7-1 and for the second quarterly sound test is in Table 7-2. Both tables compare sound level measurements of Wind Farm operation with sound level model predictions from 2003 prior to construction and ambient monitoring results from 2006. Figure 7-13 (attached) provides a site map showing sound levels measured in May and September 2007 during Wind Farm operations with sound level model estimates from 2003.

Table 7-1

First Quarterly Hourly Sound Levels from Wind Farm Operation in Relation to Sound Model Estimates and Ambient Conditions (Sound Levels in dBA)

Monitoring Position	SW Wind Near Full	SE Wind Variable Ops.	NNW Wind Variable Ops.	Non-Wind Farm Sound Level	2006 Hourly Ambient Readings	Sound Model Estimates	Actual vs Model
MP-1	47-51	48-52 50 to 75%	42-47 50 to 60%	40	33-56	51	-8 to +1
MP-2	30	NI 50 to 75%	36 75 to 100%	30	28-60	35	-5 to +1
MP-3	30	33 50 to 75%	37 75 to 100%	31	35-51	36	-5 to +1
MP-4A	NI	NI 50 to 75%	37 75 to 100%	34	29-59[A]	37	0
MP-5	39-40	39 50 to 75%	NI 75 to 100%	34	30-53	39	0 to +1
MP-6	44-45	42-45 50 to 75%	39-42 50 to 75%	33	27-55	43	-5 to +2
MP-6A	41-44	41-44 50 to 75%	38-40 50 to 75%	33	27-55[B]	42	-4 to +2
MP-7	43-44	42-43 50 to 75%	39-40 75 to 100%	32	30-53 / 27-55[C]	40	-1 to +4
MP-8	47-50	46-50 50 to 75%	41-47 50 to 60%	39	33-56[D]	47.5	-6.5 to +2.5

[A]From ambient measurements at MP-4.
[B]From ambient measurements at MP-6.
[C]From ambient measurements at M-5 & MP-6.
[D]From ambient measurements at MP-1.
Wind Farm Hourly Sound Levels (per Maine DEP 375.10) = Hourly L_{A50} – Non-Wind Farm Sound Level (per standard decibel subtraction)

Table 7-2

Second Quarterly Hourly Sound Levels from Wind Farm Operation in Relation to Sound Model Estimates and Ambient Conditions (Sound Levels in dBA)

Monitoring Position	NW Wind Near Full	Non-Wind Farm Sound Level	2006 Hourly Ambient Readings	Sound Model Estimates	Actual vs Model
MP-1	53-55	40	33-56	51	+2 to +4
MP-2	30-31	Not Used	28-60	35	-5 to -4
MP-4A	38-40	Not Used	29-59[A]	37	+1 to +3
MP-5	43-44	34	30-53	39	+4 to +5
MP-6A	43-45	33	27-55[B]	42	+1 to +3
MP-7A	43-45	32	30-53 / 27-55[C]	41	+2 to +4
MP-8	48-50	39	33-56[D]	47.5	+0.5 to +2.5

[A]From ambient measurements at MP-4.
[B]From ambient measurements at MP-6.
[C]From ambient measurements at M-5 & MP-6.
[D]From ambient measurements at MP-1.
Wind Farm Hourly Sound Levels (per Maine DEP 375.10) = Hourly L_{A50} – Non-Wind Farm Sound Level

7.2 Short Duration Repetitive and Tonal Sounds

MEDEP noise regulation requires that 5 dBA be added to short duration repetitive (SDR) and tonal sounds when they occur at a protected location. The presence of SDR and tonal sounds is determined from sound level measurements and field observations. For identification of tonal sounds, analysis of one-third octave band measurements is also required.

SDR sounds are a sequence of repetitive sounds each clearly discernible as an event that causes an increase in sound level of at least 6 dBA above the sound level observed before and after the event. SDR sounds are typically less than ten seconds in duration and occur more than once within an hour (ref. MEDEP 375.10.G.19). Measurements and field observations during Wind Farm operation indicate that sound levels from wind turbines can fluctuate over brief periods as noted by the passage of wind turbine blades. Observed measurements further indicate that these sound level fluctuations typically range from 2 to 4 dBA and thus do not result in sound level increases of 6 dBA or more. Therefore, the Wind Farm did not generate SDR sounds during the test periods as set forth in Maine DEP 375.10.

A tonal sound occurs when the sound level in a one-third octave band exceeds the arithmetic average of the sound levels in the two adjacent one-third octave bands by a specified dB amount based on the octave band center frequencies (ref. MEDEP 375.10.G.24). These criteria were compared against the third-octave band sound level measurements and observations contained in Appendix V. Results first quarterly sound testing indicated some potential for tonal sounds to occur in the third-octave band with a center frequency of 160 Hz particularly at position MP-7. This potential for tonality was found to be intermittent at MP-7 and was not observed to occur at all positions or all periods when the wind turbines were a primary sound source.

For more details regarding analysis of tonal sounds for first quarterly testing refer to Section 7.2 of the AMBIENT & OPERATIONS SOUND LEVEL MONITORING report by RSE dated June 21, 2007.

Measurement results for the second quarterly test show the potential for tonal sounds to be less prevalent and at more than one frequency and one position. Position MP-7 was relocated to Position MP-7A in response to landowner considerations. At MP-7A during periods when potential for tonality was observed, sound levels in the 160 Hz bandwidth ranged from 3 to 3.5 dB above the average of the sound levels in the adjacent bandwidths (125 and 200 Hz). This compares to a 7.8 dB differential at MP-7 during the first quarterly testing and a threshold of 8 dB at 160 Hz per Maine DEP 375.10. Tonal differentials of up to 4.5 dBA were observed in the 160 Hz bandwidth at MP-5 and up to 4.5 dBA in the 125 Hz bandwidth at MP-8, and 4 dB in the 63 Hz bandwidth at MP-1. The Maine DEP tonal threshold at 63 and 125 Hz is 15 dB.

Although the measurement results and GE specification data shows that the potential to generate a tonal sound exists, the tonal differentials do not meet the MEDEP criteria for tonal sounds.

7.3 Operating Conditions and Wind Predictions

Results of wind predictions by GHA were reviewed to determine the relationship between expected wind and operating conditions and operating conditions during the quarterly operations sound level monitoring. The predominant wind directions predicted by the GHA report were from the northwest, west, and southeast, with the northwest being the most prominent. During second quarterly testing, winds were primarily from the northwest. During first quarterly testing, three overnight test periods with significant Wind Farm operations, the wind directions ranged from southwest/west-southwest, southeast/south-southeast, and northwest/north-northwest. The wind directions during the three first quarterly nighttime periods align closely with the expected predominant wind directions.

Turbine wind speeds during nighttime periods of second quarterly testing were well above the mean wind speeds predicted by GHA. These wind speeds were sufficient to maintain Wind Farm operations at or near full power output for 8 to 12 hours. For details regarding wind speed predictions and data from first quarterly testing refer to Section 7.2 of the AMBIENT & OPERATIONS SOUND LEVEL MONITORING report by RSE dated June 21, 2007.

8.0 FINDINGS AND RECOMMENDATIONS

Sound level estimates for the Mars Hill Wind Farm were calculated in 2003 using a sound level prediction model developed for the project and sound performance data from the turbine manufacturer (GE). In December 2006, RSE conducted ambient sound level monitoring with construction of the Wind Farm substantially complete and the wind turbines shutdown. In May 2007 and September 2007, sound level monitoring was conducted during routine operation of the Wind Farm. Operating sound levels were measured under a variety of wind and weather conditions. Sound level measurements of routine Wind Farm operations were compared with non-Wind Farm ambient sound levels and sound level estimates for the Wind Farm calculated using the CADNA sound level prediction model.

Wind turbine sound levels during moderate to full operation ranged from 8 dBA below to 5 dBA above the sound level model estimates (see Table 7-1 and 7-2). A sound level change of 3 dBA is considered to be just perceptible and a change of 5 dBA is a noticeable difference. Sound level measurements farthest below the model estimates occurred at MP-1 and MP-8 during periods when nearby turbines were generally operating at less than 60% power. These reduced operating levels were not modeled but are consistent with the sound power levels provided in performance specifications by GE.

Comparing operating conditions with annual predictions from the GHA wind study indicates that sound level measurements of Wind Farm operations were taken during wind conditions at or exceeding the predicted mean wind speeds and with wind from predicted predominant directions.

Similar to Wind Farm sound levels, ambient sound levels vary with wind speed. At each of the monitoring positions, sound levels from Wind Farm operations were within the range of ambient sound levels. Due to their lower elevations, wind speeds at the monitoring positions are typically five to ten miles per hour less than at the turbine hubs. As shown by second quarterly results, this difference can increase depending upon the general wind direction, wind gradients, and amount of blockage by the terrain and vegetation. At monitoring positions where wind turbine sound was more prominent, the winds were generally light compared to wind incident at the turbine hubs. In these instances, measured sound levels from the Wind Farm were above sound levels from other sources At the same time, leaf noise was often more audible during 2nd quarterly testing, due to the dominant higher frequencies as shown in Figure 7-1.

Evaluation of measurement results for the presence of short duration repetitive sounds indicates that although sound levels from wind turbines can fluctuate over brief periods (as noted by the passage of wind turbine blades), these fluctuations do not increase sound levels by 6 dBA or more, and therefore, the wind farm does not generate short duration repetitive sounds as set forth in MEDEP 375.10.

Analysis of third-octave band sound levels for tonal sound indicates some potential for tonal sounds to primarily occur at a center frequency of 160 Hz. This potential was found to be intermittent and was not observed to occur at all positions or all periods when the wind turbines were a primary sound source. Third-octave band sound levels were also compared to frequency spectra for the 1.5sle wind turbines provided in performance specifications from GE (ref. Figure 7-13 of AMBIENT & OPERATIONS SOUND LEVEL MONITORING report by RSE dated June 21, 2007) . Although the measurement results and GE specification data show that the potential to generate a tonal sound exists, the results did not meet the criteria for tonal sounds as set forth in MEDEP 375.10.

Based on the findings of second quarterly sound testing, RSE recommends that UPC Wind conduct additional sound level measurements of Wind Farm operations during late fall and winter periods when natural sounds such as leaves, crickets, frog and bird activity will subside and consistently higher operating levels can likely be achieved under predominant wind directions. RSE also recommends additional operations testing continue using second quarter monitoring positions and ground level anemometers to track wind speed and direction In some cases and based on field conditions, adjust the locations of ground level met stations to improve tracking of wind speeds incident upon tree tops or other sources of wind-induced sound levels.

UPC Wind should continue to provide measurement results to GE and for further evaluation of turbine performance and additional sound reduction options that may be available to address specific operating conditions.

9.0 REFERENCES

Ambient & Operations Sound Level Monitoring Report, Resource Systems Engineering, June 21, 2007.

Code of Maine Regulations, Site Location of Development Regulations - Chapter 375.10, Control of Noise.

Acoustical Society of America, 1986, American National Standard Specification for Octave-Band and Fractional-Octave-Band Analog and Digital Filters (ASA 65-1986), New York, New York.

Garrad Hassan America, Assessment of the Energy Production of the Proposed Mars Hill Wind Farm, 2006.

General Electric Technical Documentation Wind Turbine Generator Systems GE 1.5 sl/sle 50 & 60 Hz, 2004.

General Electric 1.5 MW Series Wind Turbine Brochure (www.gepower.com/prod_serv/products/wind_turbines/en/downloads/ge_15_brochure.pdf)

IEC International Standard 61400-11, Wind Turbine Generator Systems – Acoustic Noise Measurement Techniques, Edition 2.1, 2006.

Maine Department of Environmental Protection, Site Location of Development, Findings of Fact and Order, No. L-21635-26-A-N, June 2004.

FIGURE 7-13. 2003 WIND FARM MODEL ESTIMATES AND MEASURED OPERATING SOUND LEVELS FROM SEPTEMBER 2007

0 600 1200
SCALE IN FEET

APPROXIMATE LOCATION OF RESIDENCE

APPROXIMATE LOCATION OF RESIDENCE CONSTRUCTED SINCE 2003

T3 AS-BUILT WIND TURBINE SITE

COMMUNITY SOUND LEVEL MONITORING POSITION

51/42-52 MODEL ESTIMATE/RANGE OF MEASURED SOUND LEVELS

MET STATION

N

MP-1
51/53-55

MP-8
47.5/48-50

MP-6

MP-6A
42/43-45

MP-7

MP-7A
41/43-45

MP-2
35/30-31

MP-5
39/43-44

MP-4

MP-4A
37/38-40

MP-3

WIND FARM PROPERTY BOUNDARY

EAST RIDGE ROAD

COUNTRY CLUB ROAD

BELL HILL ROAD

BOYNTON ROAD

MOUNTAIN ROAD

35 dBA

40 dBA

45 dBA

50 dBA

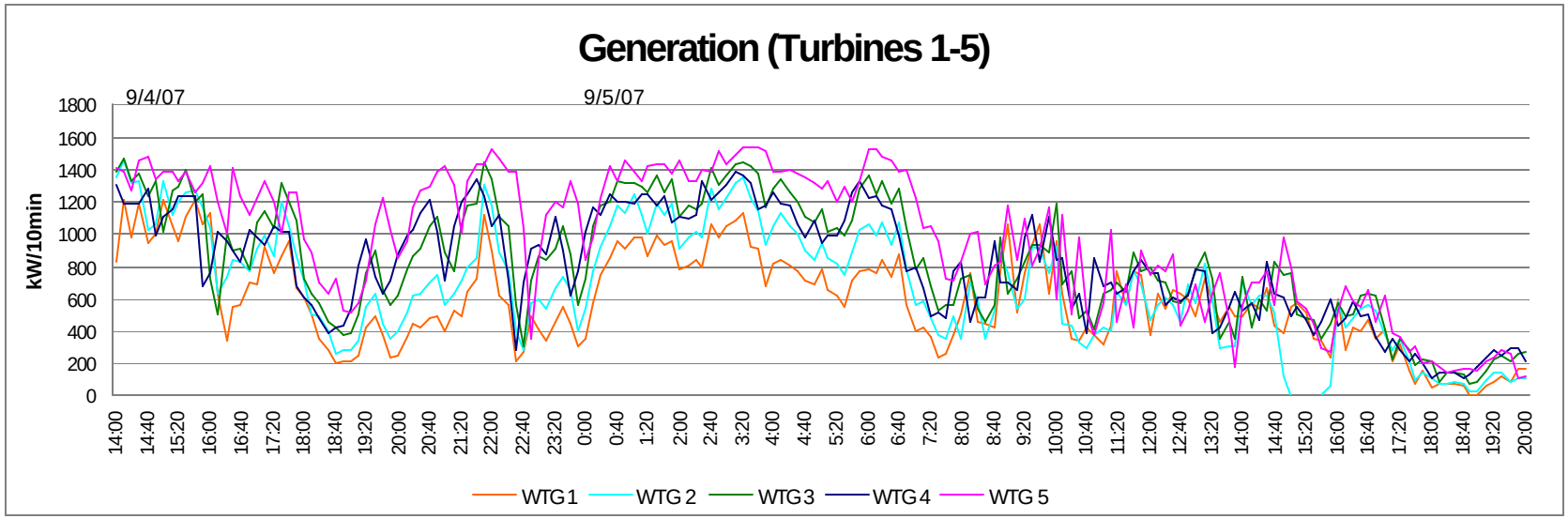
55 dBA

SOUND LEVEL CONTOURS FROM 2003 SOUND MODEL ESTIMATES

55 dBA
50 dBA
45 dBA
40 dBA
35 dBA

Revised 11-2-07

APPENDIX III
WIND TURBINE POWER PRODUCTION AND WIND SPEEDS – SEPTEMBER 4 TO 5, 2007
(compiled by UPC Operations)


Generation (Turbines 1-5)
9/4/07
9/5/07
kW/10min
1800
1600
1400
1200
1000
800
600
400
200
0
14:00
14:40
15:20
16:00
16:40
17:20
18:00
18:40
19:20
20:00
20:40
21:20
22:00
22:40
23:20
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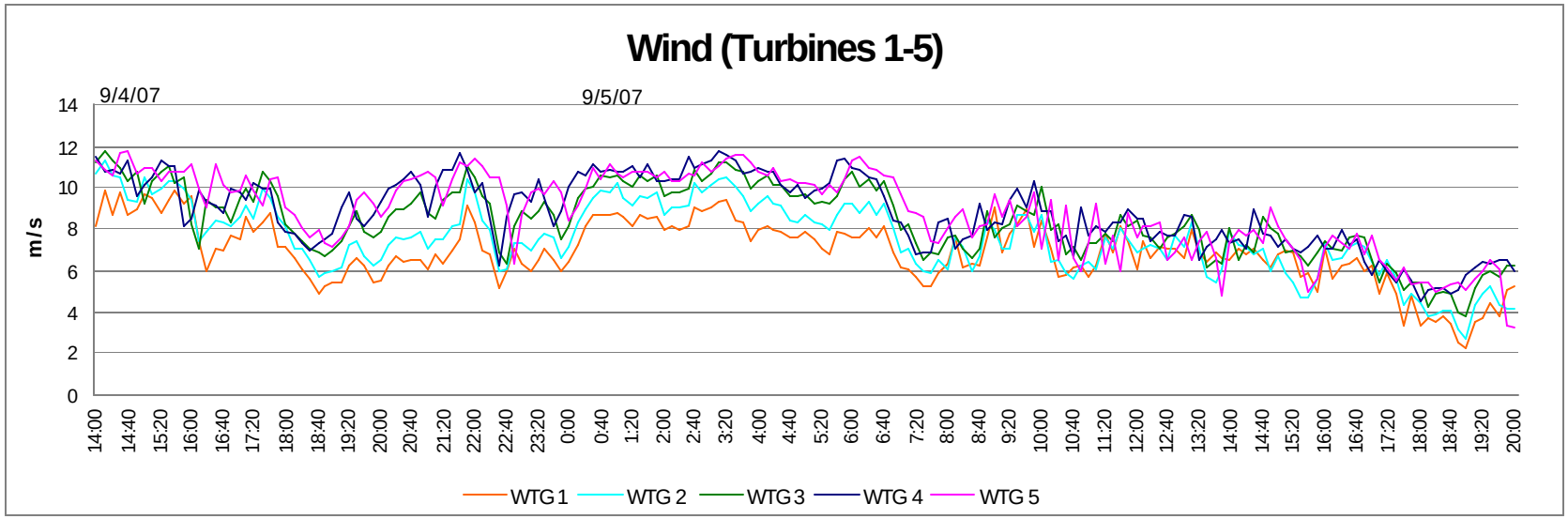
11:20
12:00
12:40
13:20
14:00
14:40
15:20
16:00
16:40
17:20
18:00
18:40
19:20
20:00
WTG 1
WTG 2
WTG 3
WTG 4
WTG 5


Wind (Turbines 1-5)
9/4/07
9/5/07
m/s
14
12
10
8
6
4
2
0
14:00
14:40
15:20
16:00
16:40
17:20
18:00
18:40
19:20
20:00
20:40
21:20
22:00
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11:20
12:00
12:40
13:20
14:00
14:40
15:20
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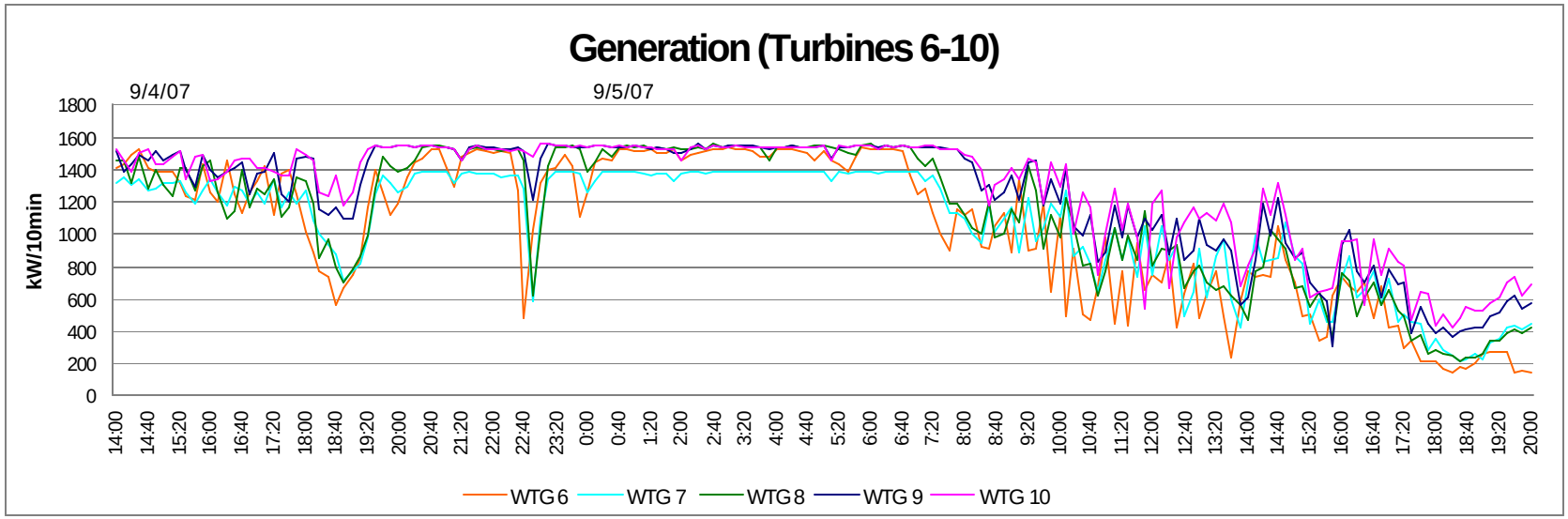
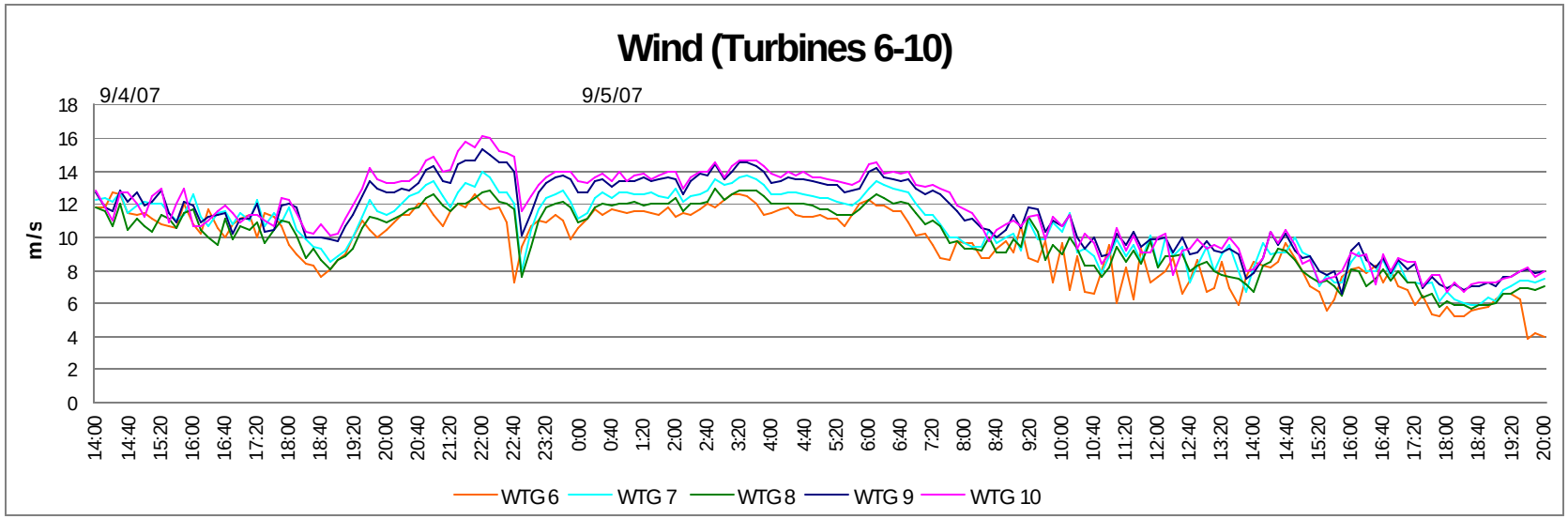
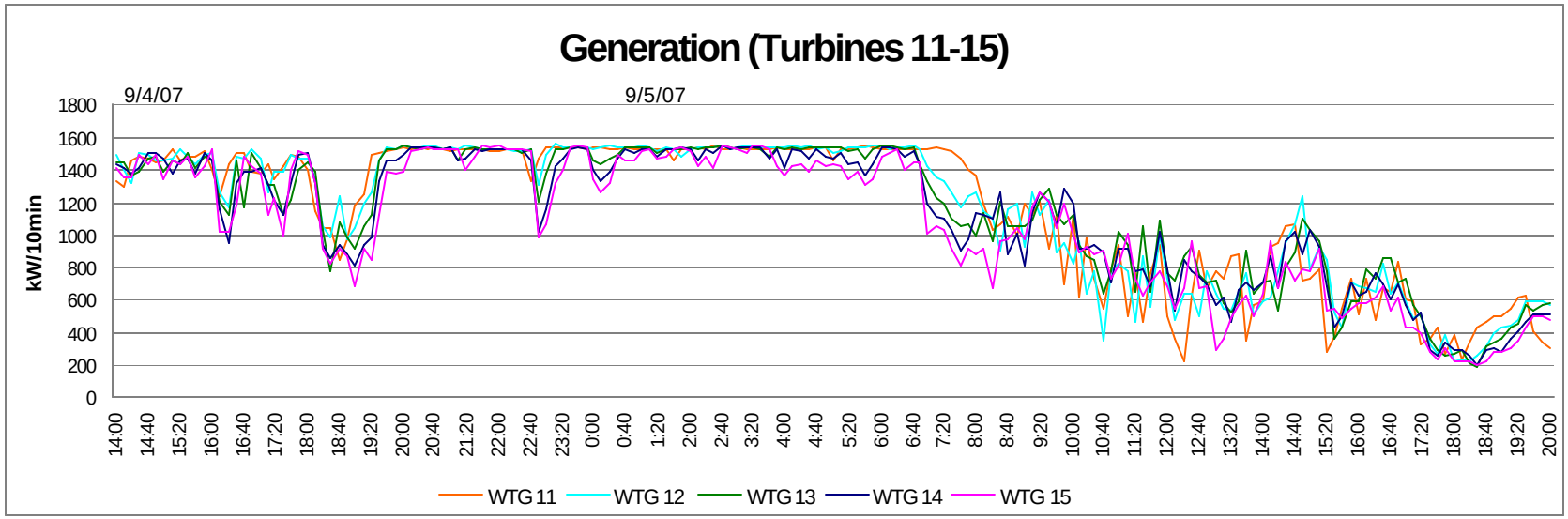
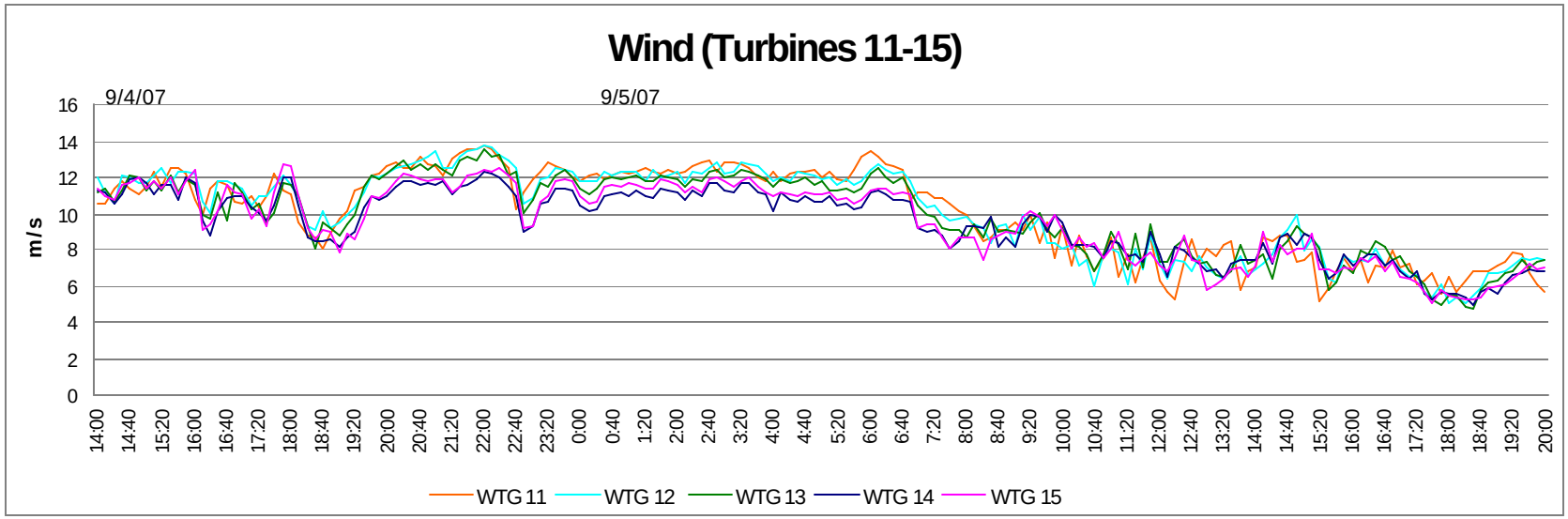
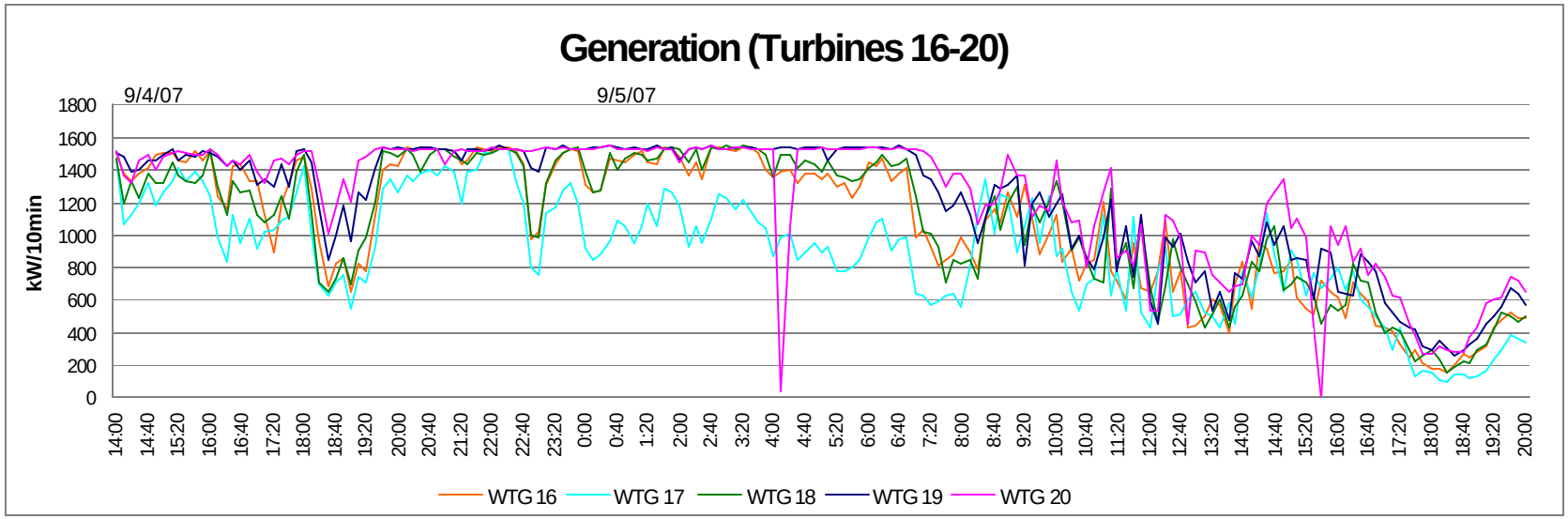
19:20
20:00
WTG 1
WTG 2
WTG 3
WTG 4
WTG 5


Generation (Turbines 6-10)
9/4/07
9/5/07
kW/10min
1800
1600
1400
1200
1000
800
600
400
200
0
14:00 14:40 15:20 16:00 16:40 17:20 18:00 18:40 19:20 20:00 20:40 21:20 22:00 22:40 23:20 0:00 0:40 1:20 2:00 2:40 3:20 4:00 4:40 5:20 6:00 6:40 7:20 8:00 8:40 9:20 10:00 10:40 11:20 12:00 12:40 13:20 14:00 14:40 15:20 16:00 16:40 17:20 18:00 18:40 19:20 20:00
WTG 6
WTG 7
WTG 8
WTG 9
WTG 10


Wind (Turbines 6-10)
9/4/07
9/5/07
m/s
18
16
14
12
10
8
6
4
2
0
14:00 14:40 15:20 16:00 16:40 17:20 18:00 18:40 19:20 20:00 20:40 21:20 22:00 22:40 23:20 0:00 0:40 1:20 2:00 2:40 3:20 4:00 4:40 5:20 6:00 6:40 7:20 8:00 8:40 9:20 10:00 10:40 11:20 12:00 12:40 13:20 14:00 14:40 15:20 16:00 16:40 17:20 18:00 18:40 19:20 20:00
WTG 6
WTG 7
WTG 8
WTG 9
WTG 10


Generation (Turbines 11-15)
9/4/07
9/5/07
kW/10min
1800
1600
1400
1200
1000
800
600
400
200
0
14:00 14:40 15:20 16:00 16:40 17:20 18:00 18:40 19:20 20:00 20:40 21:20 22:00 22:40 23:20 0:00 0:40 1:20 2:00 2:40 3:20 4:00 4:40 5:20 6:00 6:40 7:20 8:00 8:40 9:20 10:00 10:40 11:20 12:00 12:40 13:20 14:00 14:40 15:20 16:00 16:40 17:20 18:00 18:40 19:20 20:00
WTG 11
WTG 12
WTG 13
WTG 14
WTG 15


Wind (Turbines 11-15)
9/4/07
9/5/07
m/s
16
14
12
10
8
6
4
2
0
14:00 14:40 15:20 16:00 16:40 17:20 18:00 18:40 19:20 20:00 20:40 21:20 22:00 22:40 23:20 0:00 0:40 1:20 2:00 2:40 3:20 4:00 4:40 5:20 6:00 6:40 7:20 8:00 8:40 9:20 10:00 10:40 11:20 12:00 12:40 13:20 14:00 14:40 15:20 16:00 16:40 17:20 18:00 18:40 19:20 20:00
WTG 11
WTG 12
WTG 13
WTG 14
WTG 15


Generation (Turbines 16-20)
9/4/07
9/5/07
kW/10min
1800
1600
1400
1200
1000
800
600
400
200
0
14:00
14:40
15:20
16:00
16:40
17:20
18:00
18:40
19:20
20:00
20:40
21:20
22:00
22:40
23:20
0:00
0:40
1:20
2:00
2:40
3:20
4:00
4:40
5:20
6:00
6:40
7:20
8:00
8:40
9:20
10:00
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11:20
12:00
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13:20
14:00
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15:20
16:00
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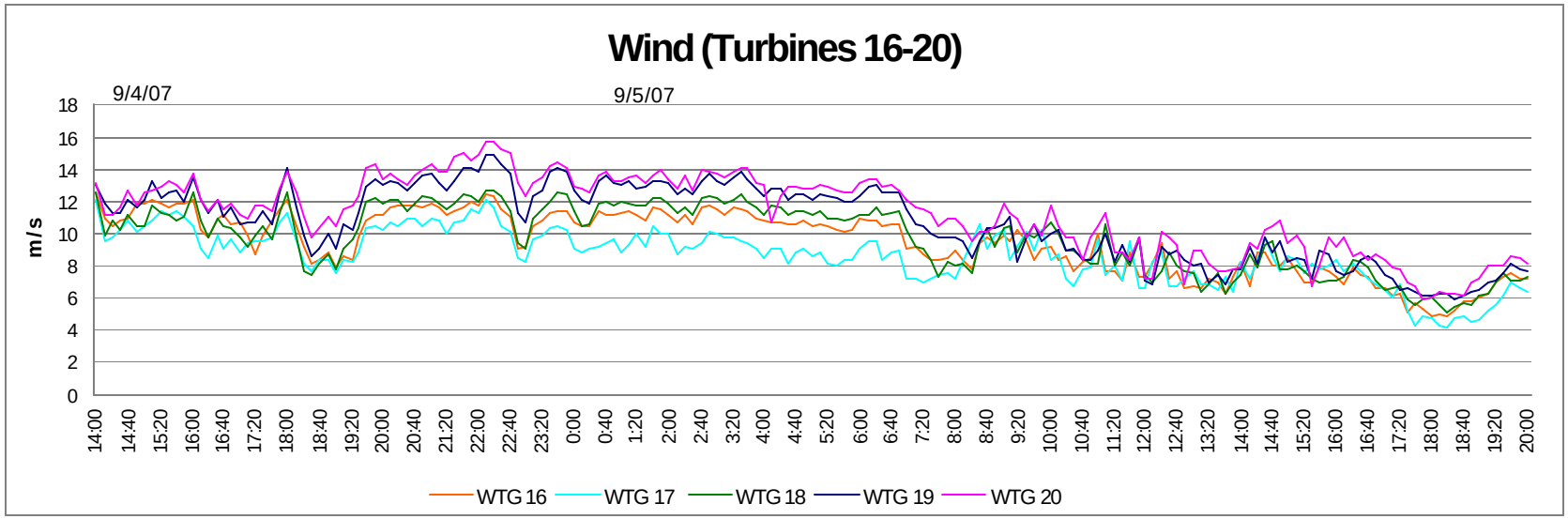
20:00
WTG 16
WTG 17
WTG 18
WTG 19
WTG 20


Wind (Turbines 16-20)
9/4/07
9/5/07
m/s
18
16
14
12
10
8
6
4
2
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14:00
14:40
15:20
16:00
16:40
17:20
18:00
18:40
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11:20
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WTG 16
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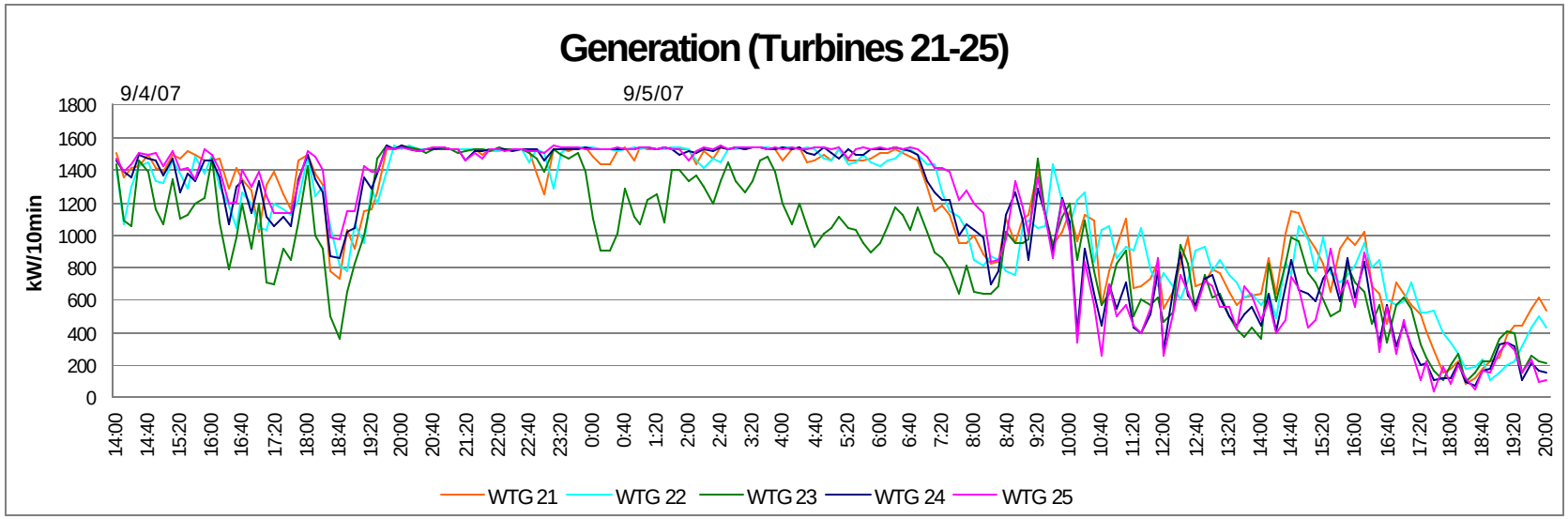
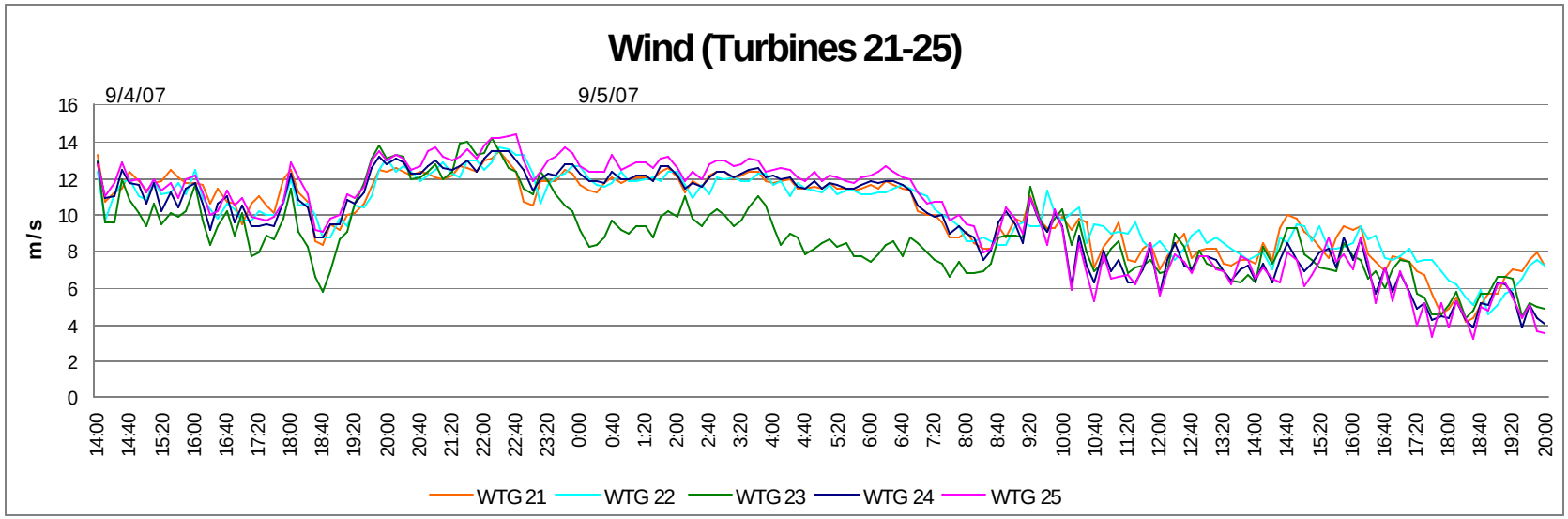
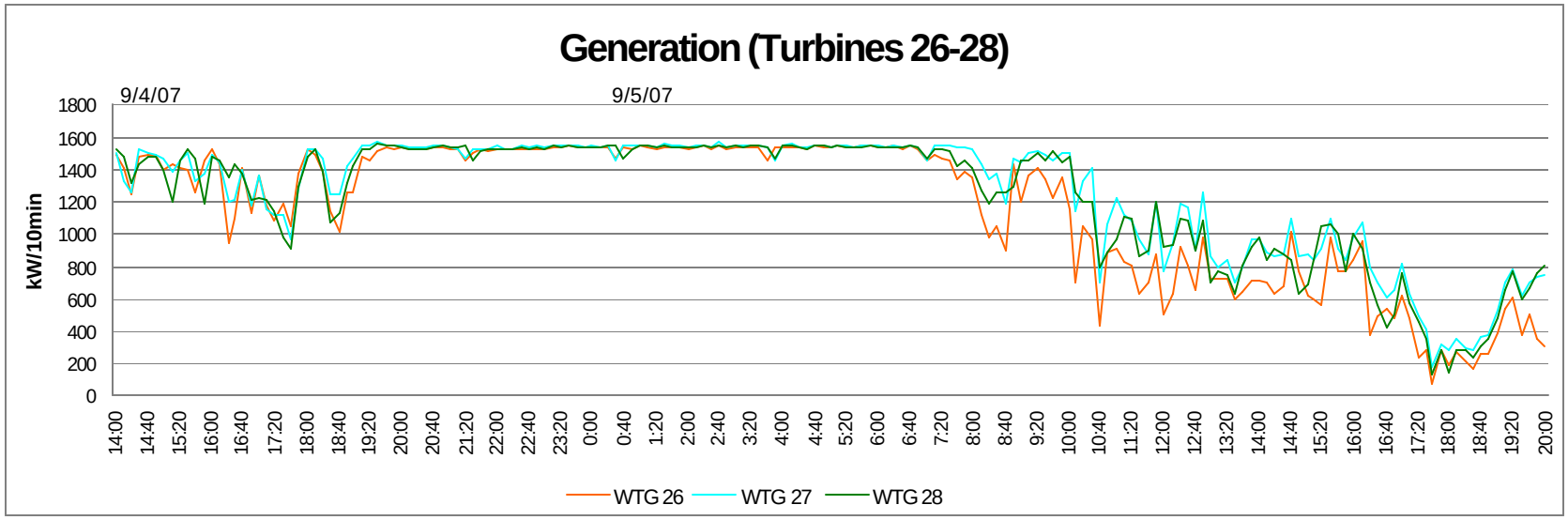
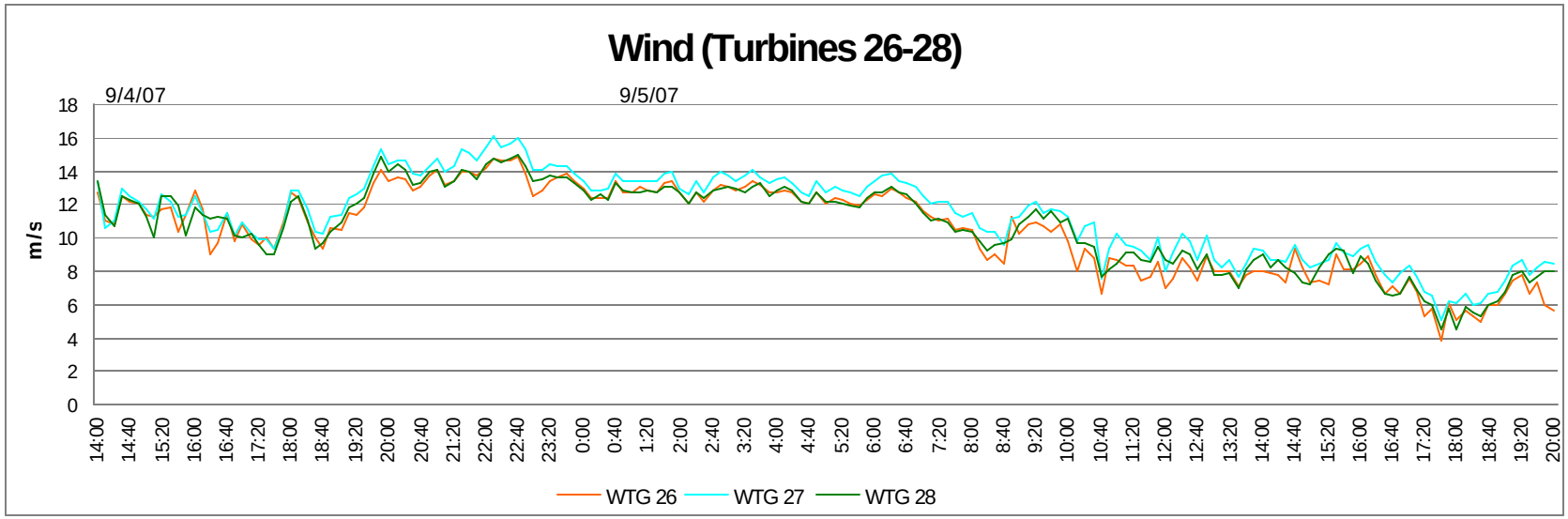
WTG 20


Generation (Turbines 21-25)
9/4/07
9/5/07
kW/10min
1800
1600
1400
1200
1000
800
600
400
200
0
14:00 14:40 15:20 16:00 16:40 17:20 18:00 18:40 19:20 20:00 20:40 21:20 22:00 22:40 23:20 0:00 0:40 1:20 2:00 2:40 3:20 4:00 4:40 5:20 6:00 6:40 7:20 8:00 8:40 9:20 10:00 10:40 11:20 12:00 12:40 13:20 14:00 14:40 15:20 16:00 16:40 17:20 18:00 18:40 19:20 20:00
WTG 21
WTG 22
WTG 23
WTG 24
WTG 25


Wind (Turbines 21-25)
9/4/07
9/5/07
m/s
16
14
12
10
8
6
4
2
0
14:00 14:40 15:20 16:00 16:40 17:20 18:00 18:40 19:20 20:00 20:40 21:20 22:00 22:40 23:20 0:00 0:40 1:20 2:00 2:40 3:20 4:00 4:40 5:20 6:00 6:40 7:20 8:00 8:40 9:20 10:00 10:40 11:20 12:00 12:40 13:20 14:00 14:40 15:20 16:00 16:40 17:20 18:00 18:40 19:20 20:00
WTG 21
WTG 22
WTG 23
WTG 24
WTG 25

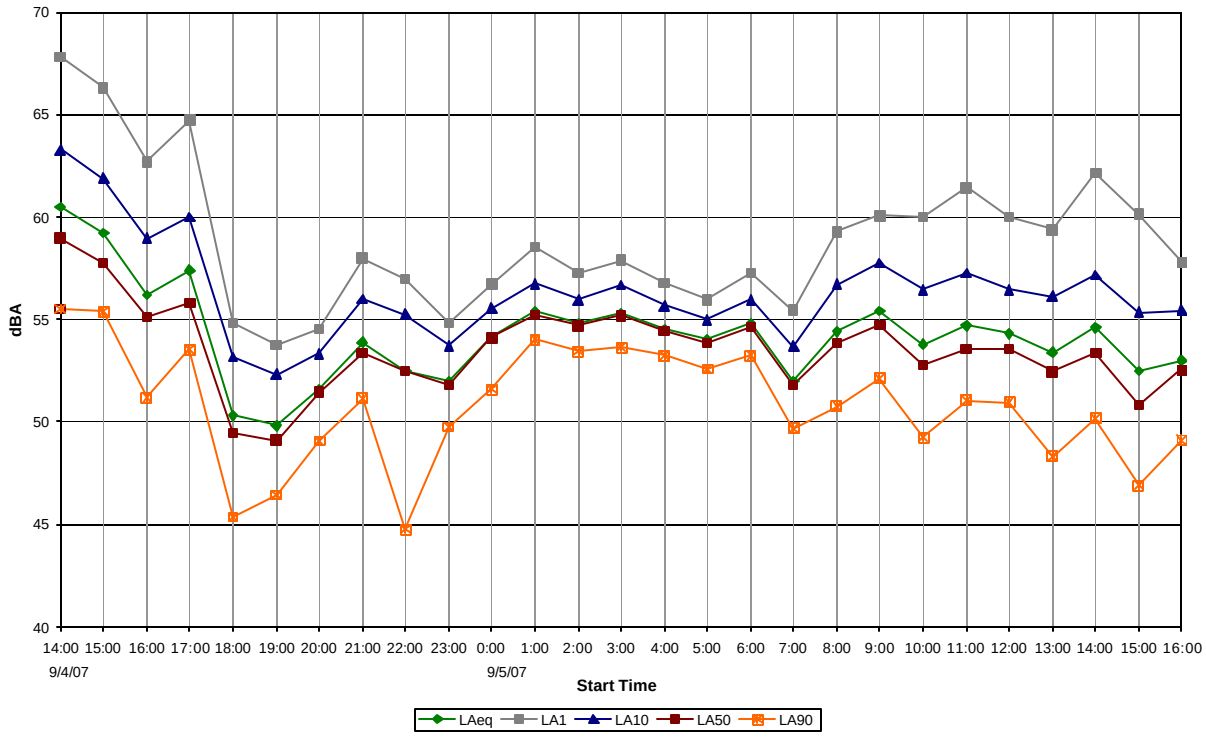

Generation (Turbines 26-28)
9/4/07
9/5/07
kW/10min
1800
1600
1400
1200
1000
800
600
400
200
0
14:00
14:40
15:20
16:00
16:40
17:20
18:00
18:40
19:20
20:00
20:40
21:20
22:00
22:40
23:20
0:00
0:40
1:20
2:00
2:40
3:20
4:00
4:40
5:20
6:00
6:40
7:20
8:00
8:40
9:20
10:00
10:40
11:20
12:00
12:40
13:20
14:00
14:40
15:20
16:00
16:40
17:20
18:00
18:40
19:20
20:00
WTG 26
WTG 27
WTG 28


Wind (Turbines 26-28)
9/4/07
9/5/07
m/s
18
16
14
12
10
8
6
4
2
0
14:00
14:40
15:20
16:00
16:40
17:20
18:00
18:40
19:20
20:00
20:40
21:20
22:00
22:40
23:20
0:00
0:40
1:20
2:00
2:40
3:20
4:00
4:40
5:20
6:00
6:40
7:20
8:00
8:40
9:20
10:00
10:40
11:20
12:00
12:40
13:20
14:00
14:40
15:20
16:00
16:40
17:20
18:00
18:40
19:20
20:00
WTG 26
WTG 27
WTG 28

APPENDIX IV
SOUND LEVEL MEASUREMENTS OF WIND FARM OPERATION –SEPTEMBER 2007

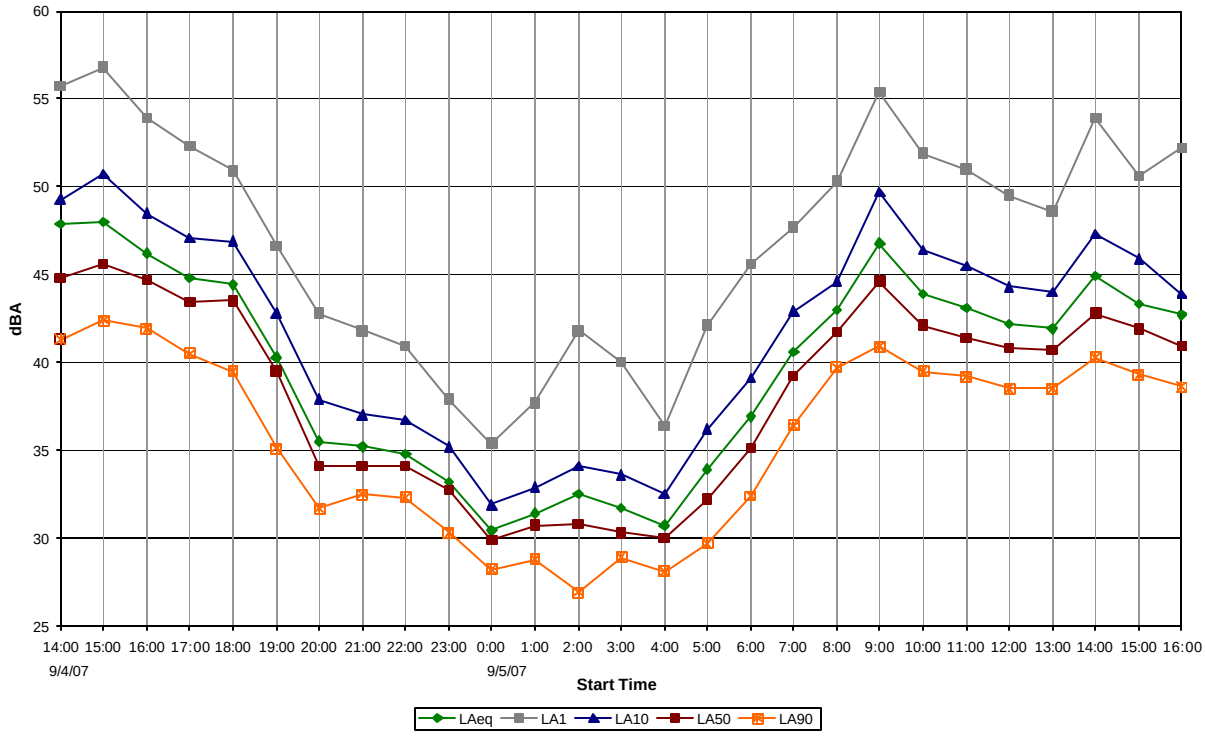
MP-1
September 4 to 5, 2007

Start Time	Duration (min.)	Measured Sound Levels (dBA)				
		L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{A90}
14:00	60	61	68	63	59	56
15:00	60	59	66	62	58	55
16:00	60	56	63	59	55	51
17:00	60	57	65	60	56	54
18:00	60	50	55	53	49	45
19:00	60	50	54	52	49	46
20:00	60	52	55	53	51	49
21:00	60	54	58	56	53	51
22:00	60	53	57	55	52	45
23:00	60	52	55	54	52	50
0:00	60	54	57	56	54	52
1:00	60	55	59	57	55	54
2:00	60	55	57	56	55	53
3:00	60	55	58	57	55	54
4:00	60	55	57	56	54	53
5:00	60	54	56	55	54	53
6:00	60	55	57	56	55	53
7:00	60	52	55	54	52	50
8:00	60	54	59	57	54	51
9:00	60	55	60	58	55	52
10:00	60	54	60	56	53	49
11:00	60	55	61	57	54	51
12:00	60	54	60	56	54	51
13:00	60	53	59	56	52	48
14:00	60	55	62	57	53	50
15:00	60	53	60	55	51	47
16:00	60	53	58	55	53	49



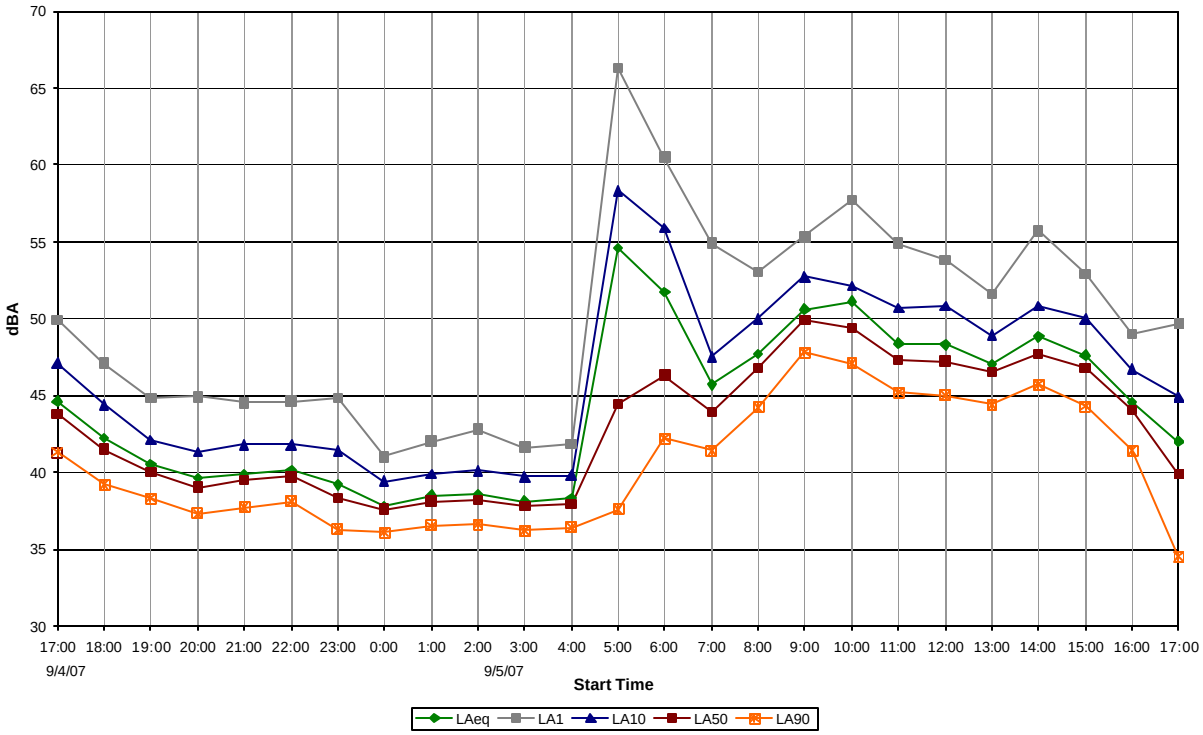
MP-2
September 4 to 5, 2007

Start Time	Duration (min.)	Measured Sound Levels (dBA)				
		L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{A90}
14:00	60	48	56	49	45	41
15:00	60	48	57	51	46	42
16:00	60	46	54	49	45	42
17:00	60	45	52	47	43	41
18:00	60	44	51	47	44	40
19:00	60	40	47	43	40	35
20:00	60	36	43	38	34	32
21:00	60	35	42	37	34	33
22:00	60	35	41	37	34	32
23:00	60	33	38	35	33	30
0:00	60	30	35	32	30	28
1:00	60	31	38	33	31	29
2:00	60	33	42	34	31	27
3:00	60	32	40	34	30	29
4:00	60	31	36	33	30	28
5:00	60	34	42	36	32	30
6:00	60	37	46	39	35	32
7:00	60	41	48	43	39	36
8:00	60	43	50	45	42	40
9:00	60	47	55	50	45	41
10:00	60	44	52	46	42	40
11:00	60	43	51	46	41	39
12:00	60	42	50	44	41	39
13:00	60	42	49	44	41	39
14:00	60	45	54	47	43	40
15:00	60	43	51	46	42	39
16:00	60	43	52	44	41	39



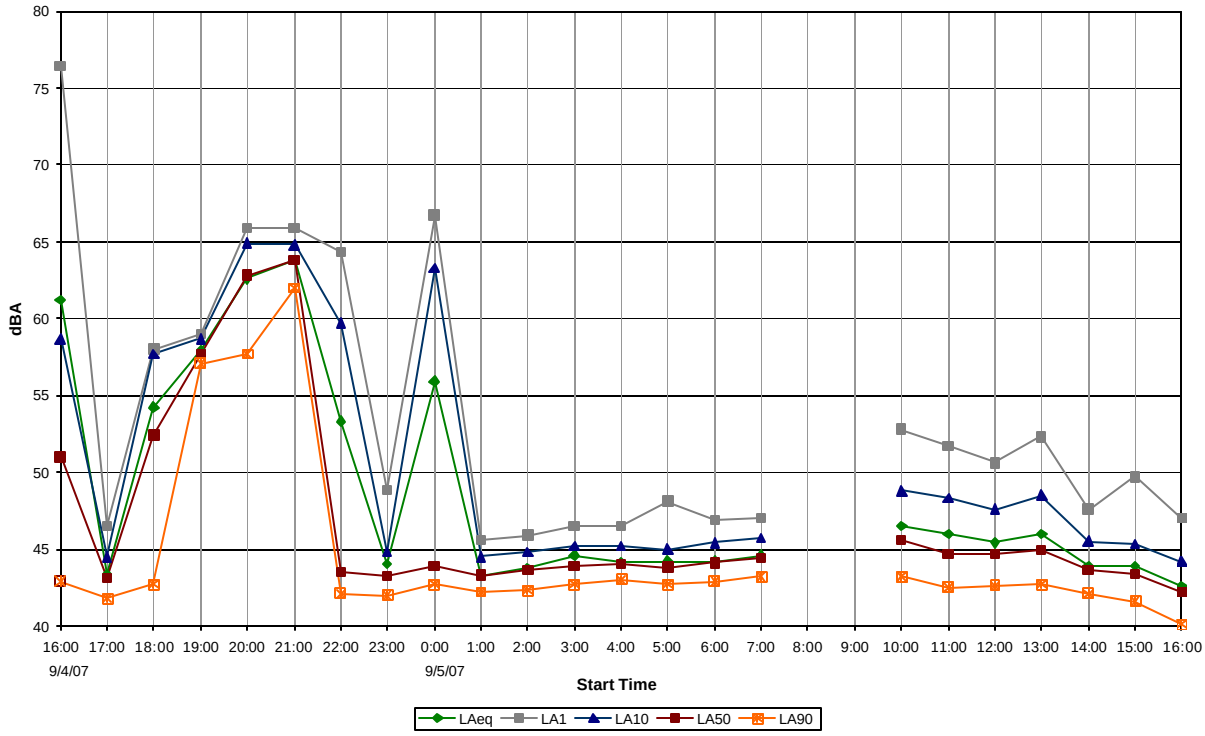
MP-4A
September 4 to 5, 2007

Start Time	Duration (min.)	Measured Sound Levels (dBA)				
		L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{A90}
17:00	60	45	50	47	44	41
18:00	60	42	47	44	42	39
19:00	60	41	45	42	40	38
20:00	60	40	45	41	39	37
21:00	60	40	45	42	40	38
22:00	60	40	45	42	40	38
23:00	60	39	45	41	38	36
0:00	60	38	41	39	38	36
1:00	60	39	42	40	38	37
2:00	60	39	43	40	38	37
3:00	60	38	42	40	38	36
4:00	60	38	42	40	38	36
5:00	60	55	66	58	44	38
6:00	60	52	61	56	46	42
7:00	60	46	55	48	44	41
8:00	60	48	53	50	47	44
9:00	60	51	55	53	50	48
10:00	60	51	58	52	49	47
11:00	60	48	55	51	47	45
12:00	60	48	54	51	47	45
13:00	60	47	52	49	47	44
14:00	60	49	56	51	48	46
15:00	60	48	53	50	47	44
16:00	60	45	49	47	44	41
17:00	60	42	50	45	40	35



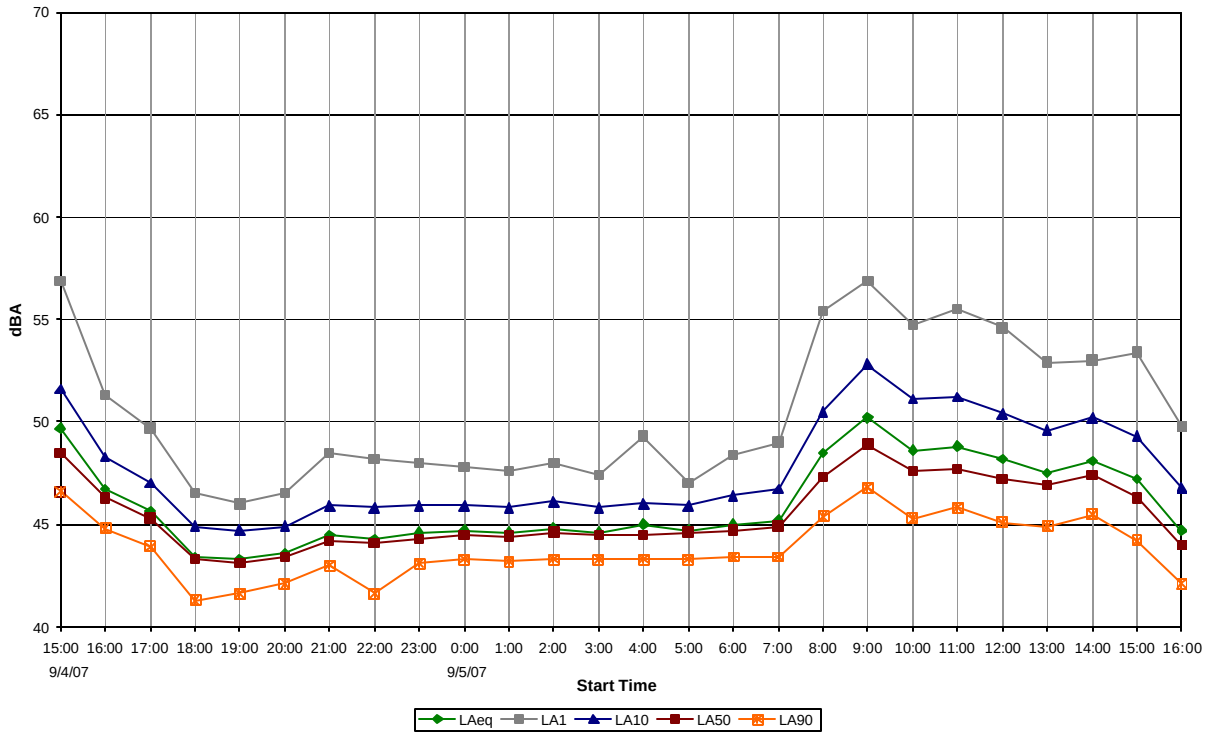
MP-5
September 4 to 5, 2007

Start Time	Duration (min.)	Measured Sound Levels (dBA)				
		L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{A90}
16:00	60	61	76	59	51	43
17:00	60	43	47	45	43	42
18:00	60	54	58	58	52	43
19:00	60	58	59	59	58	57
20:00	60	63	66	65	63	58
21:00	60	64	66	65	64	62
22:00	60	53	64	60	44	42
23:00	60	44	49	45	43	42
0:00	60	56	67	63	44	43
1:00	60	43	46	45	43	42
2:00	60	44	46	45	44	42
3:00	60	45	47	45	44	43
4:00	60	44	47	45	44	43
5:00	60	44	48	45	44	43
6:00	60	44	47	45	44	43
7:00	60	45	47	46	44	43
meter measuring high (recalibrated)						
10:00	60	47	53	49	46	43
11:00	60	46	52	48	45	43
12:00	60	45	51	48	45	43
13:00	60	46	52	49	45	43
14:00	60	44	48	46	44	42
15:00	60	44	50	45	43	42
16:00	60	43	47	44	42	40



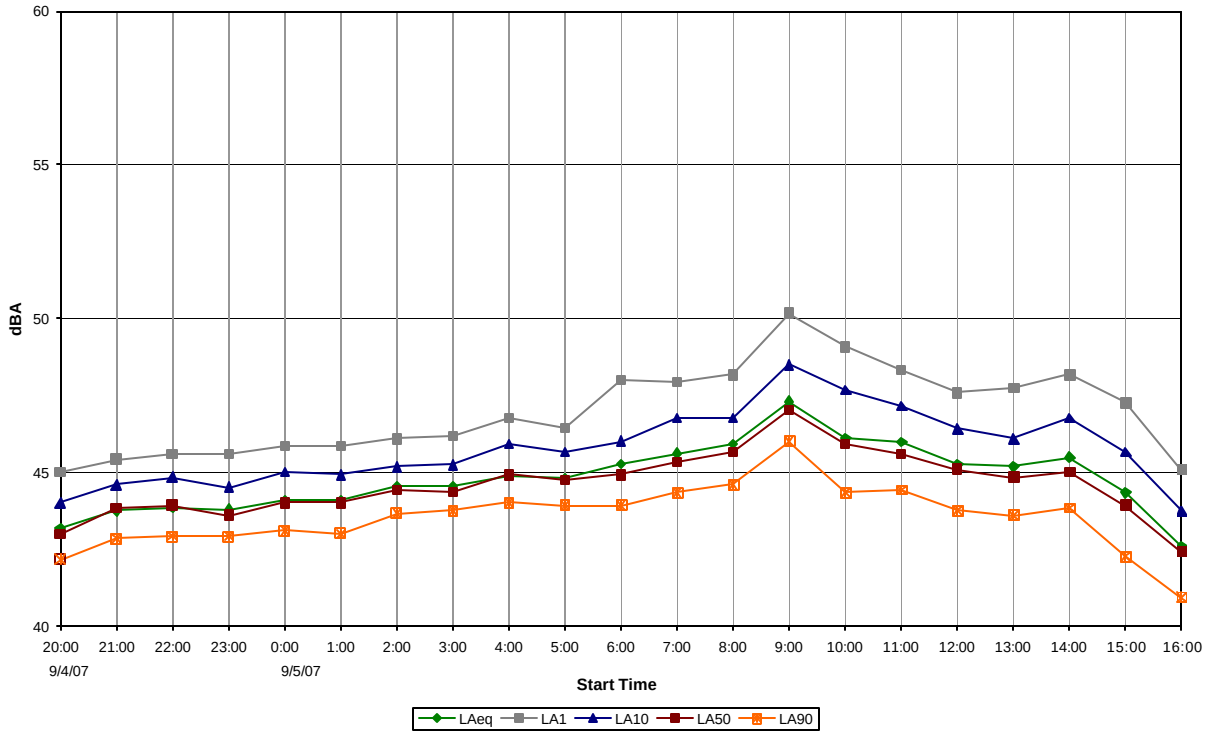
MP-6A
September 4 to 5, 2007

Start Time	Duration (min.)	Measured Sound Levels (dBA)				
		L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{A90}
15:00	60	50	57	52	49	47
16:00	60	47	51	48	46	45
17:00	60	46	50	47	45	44
18:00	60	43	47	45	43	41
19:00	60	43	46	45	43	42
20:00	60	44	47	45	43	42
21:00	60	45	49	46	44	43
22:00	60	44	48	46	44	42
23:00	60	45	48	46	44	43
0:00	60	45	48	46	45	43
1:00	60	45	48	46	44	43
2:00	60	45	48	46	45	43
3:00	60	45	47	46	45	43
4:00	60	45	49	46	45	43
5:00	60	45	47	46	45	43
6:00	60	45	48	46	45	43
7:00	60	45	49	47	45	43
8:00	60	49	55	51	47	45
9:00	60	50	57	53	49	47
10:00	60	49	55	51	48	45
11:00	60	49	56	51	48	46
12:00	60	48	55	50	47	45
13:00	60	48	53	50	47	45
14:00	60	48	53	50	47	46
15:00	60	47	53	49	46	44
16:00	60	45	50	47	44	42



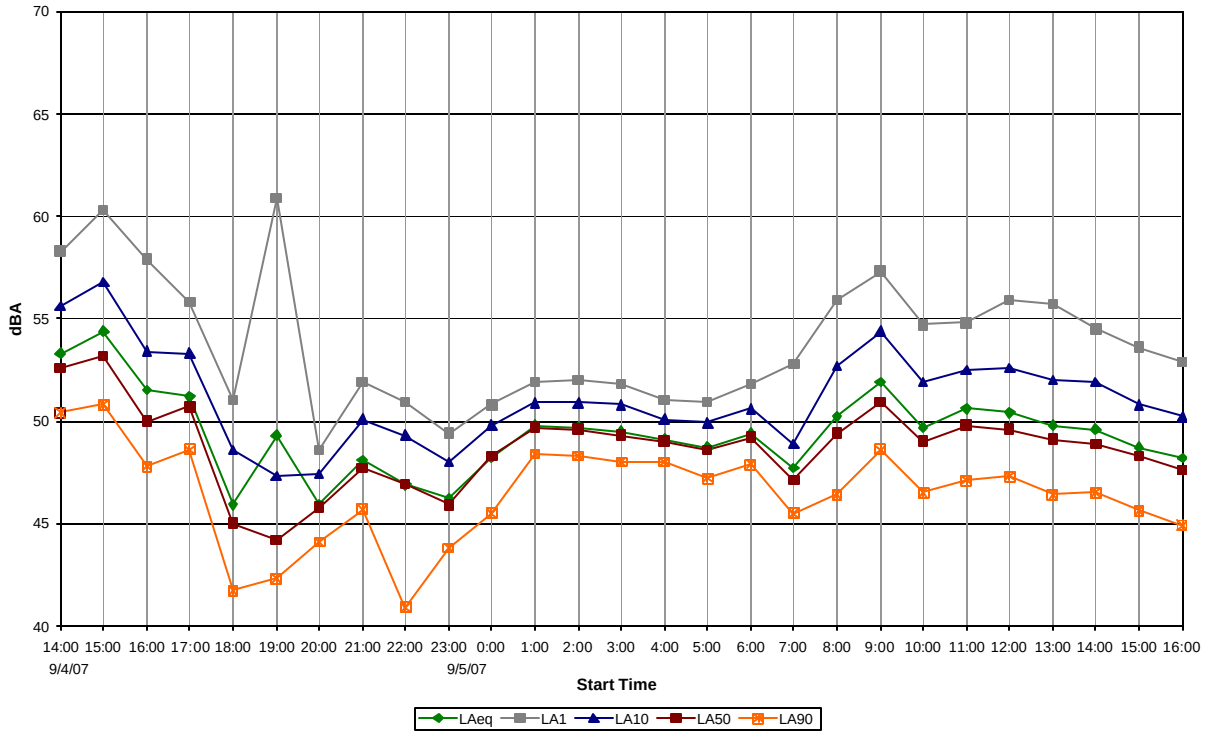
MP-7A
September 4 to 5, 2007

Start Time	Duration (min.)	Measured Sound Levels (dBA)				
		L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{A90}
20:00	60	43	45	44	43	42
21:00	60	44	45	45	44	43
22:00	60	44	46	45	44	43
23:00	60	44	46	45	44	43
0:00	60	44	46	45	44	43
1:00	60	44	46	45	44	43
2:00	60	45	46	45	44	44
3:00	60	45	46	45	44	44
4:00	60	45	47	46	45	44
5:00	60	45	46	46	45	44
6:00	60	45	48	46	45	44
7:00	60	46	48	47	45	44
8:00	60	46	48	47	46	45
9:00	60	47	50	49	47	46
10:00	60	46	49	48	46	44
11:00	60	46	48	47	46	44
12:00	60	45	48	46	45	44
13:00	60	45	48	46	45	44
14:00	60	45	48	47	45	44
15:00	60	44	47	46	44	42
16:00	60	43	45	44	42	41



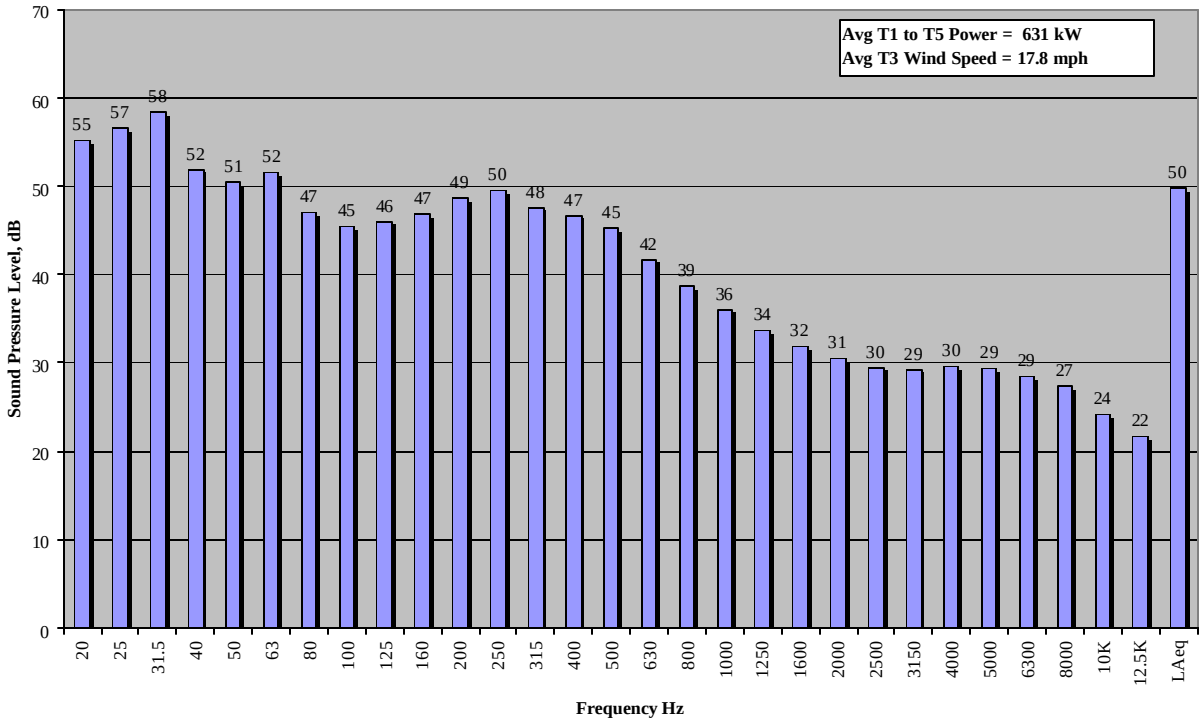
MP-8
September 4 to 5, 2007

Start Time	Duration (min.)	Measured Sound Levels (dBA)				
		L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{A90}
14:00	60	53	58	56	53	50
15:00	60	54	60	57	53	51
16:00	60	52	58	53	50	48
17:00	60	51	56	53	51	49
18:00	60	46	51	49	45	42
19:00	60	49	61	47	44	42
20:00	60	46	49	47	46	44
21:00	60	48	52	50	48	46
22:00	60	47	51	49	47	41
23:00	60	46	49	48	46	44
0:00	60	48	51	50	48	46
1:00	60	50	52	51	50	48
2:00	60	50	52	51	50	48
3:00	60	50	52	51	49	48
4:00	60	49	51	50	49	48
5:00	60	49	51	50	49	47
6:00	60	49	52	51	49	48
7:00	60	48	53	49	47	46
8:00	60	50	56	53	49	46
9:00	60	52	57	54	51	49
10:00	60	50	55	52	49	47
11:00	60	51	55	53	50	47
12:00	60	50	56	53	50	47
13:00	60	50	56	52	49	46
14:00	60	50	55	52	49	47
15:00	60	49	54	51	48	46
16:00	60	48	53	50	48	45

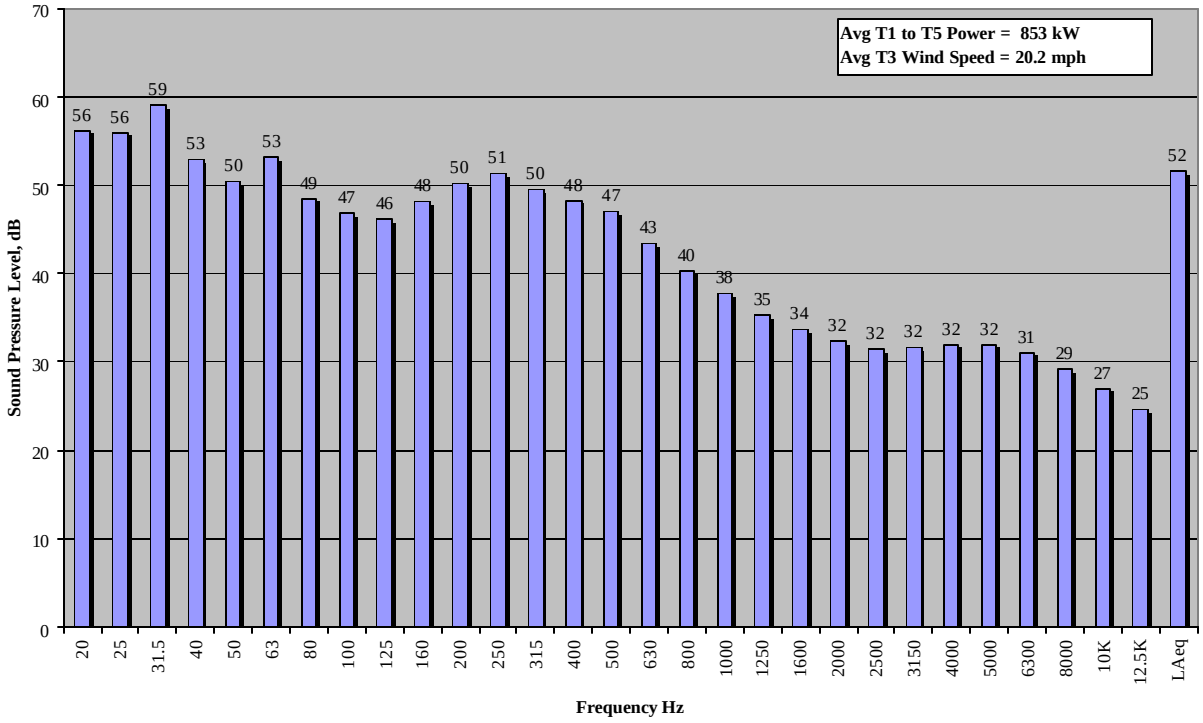


APPENDIX V
ONE-THIRD OCTAVE BAND SOUND LEVEL MEASUREMENTS – SEPTEMBER 2007

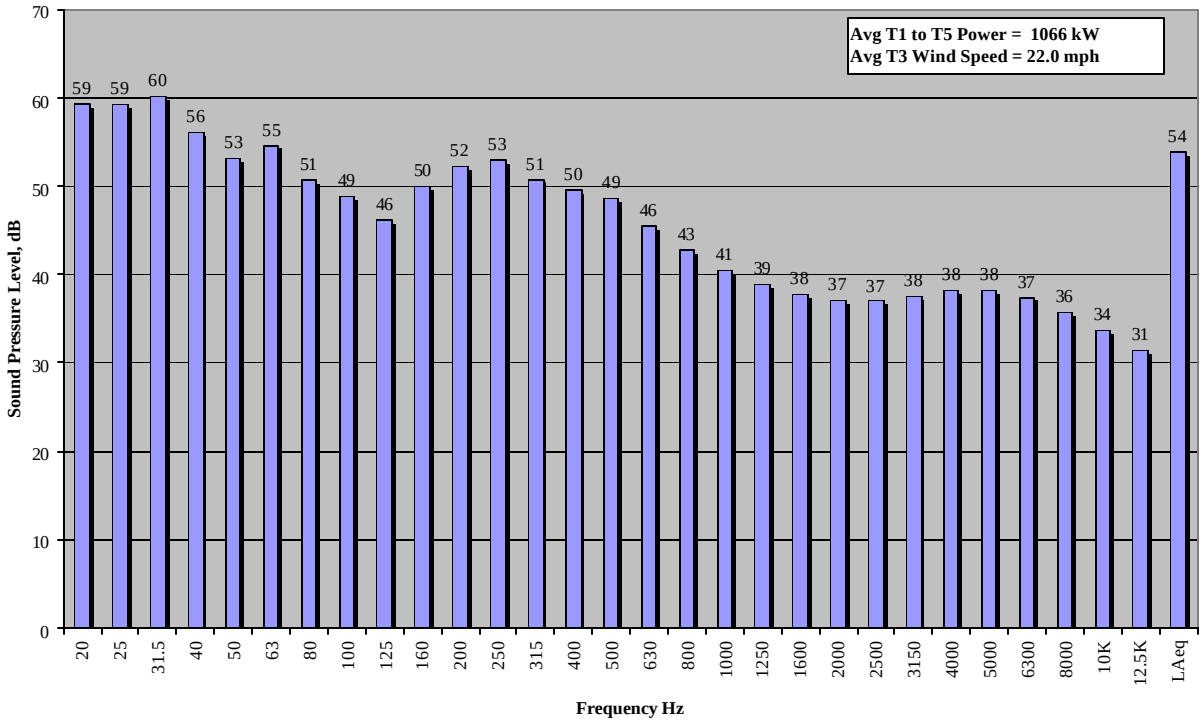
MP-1
4-Sept-07 19:00 to 20:00



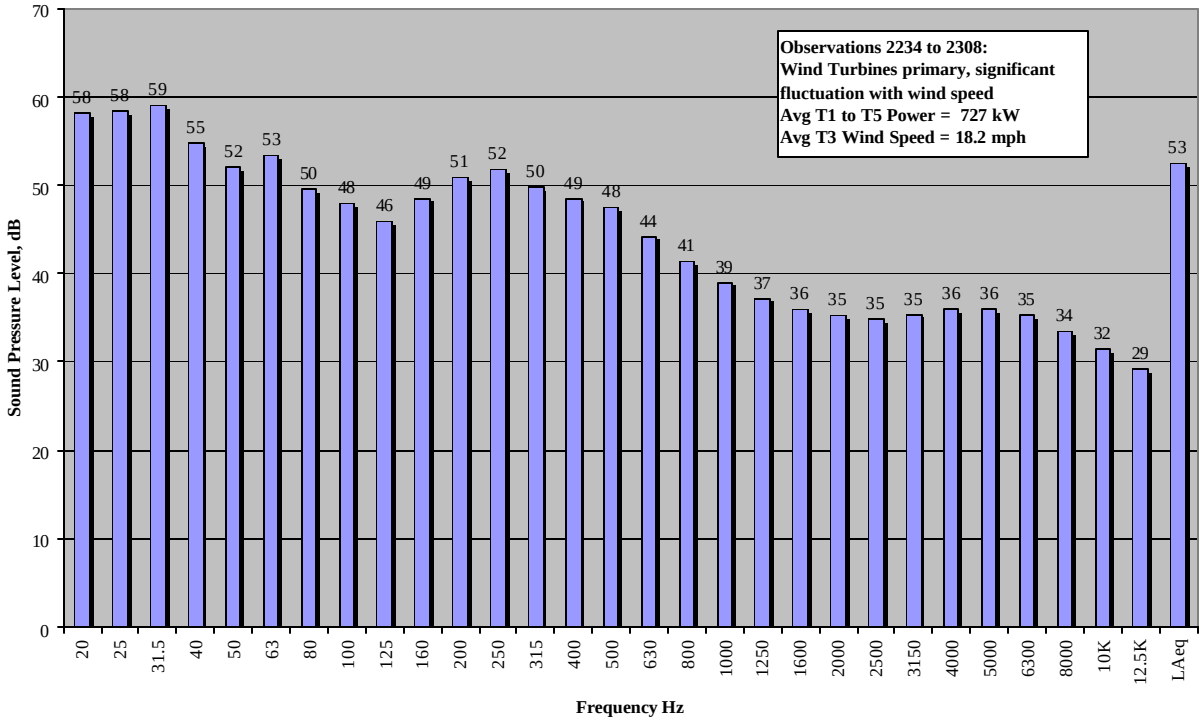
MP-1
4-Sept-07 20:00 to 21:00



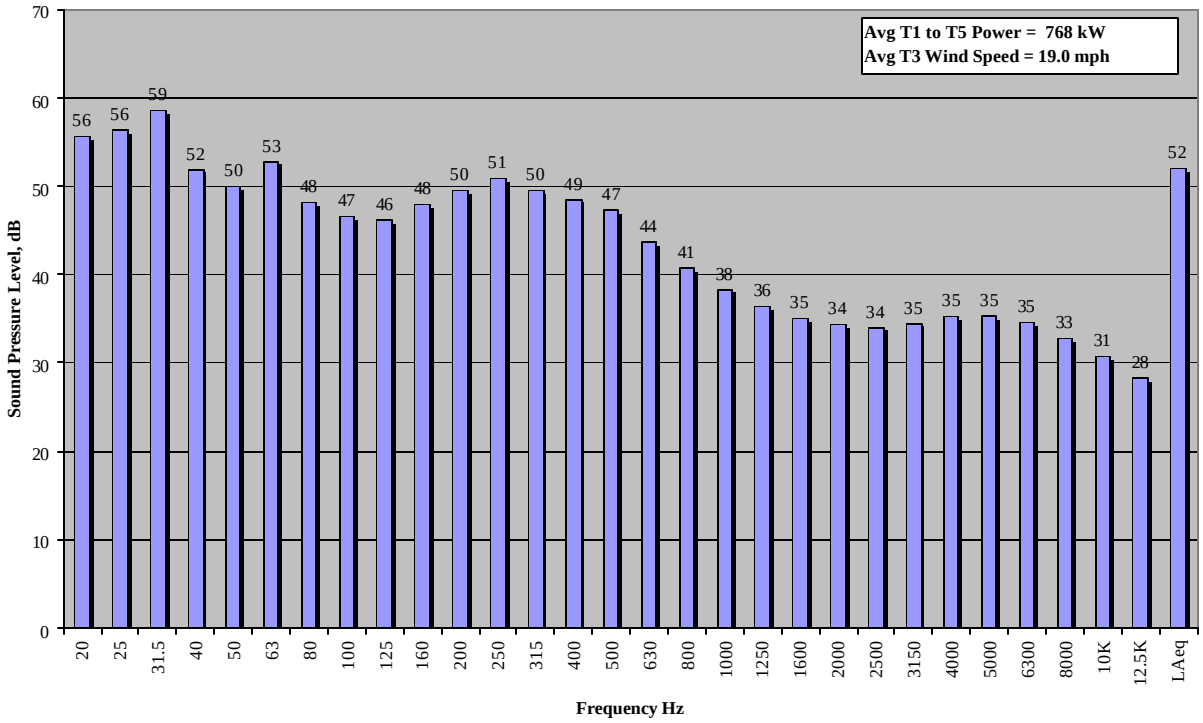
MP-1
4-Sept-07 21:00 to 22:00



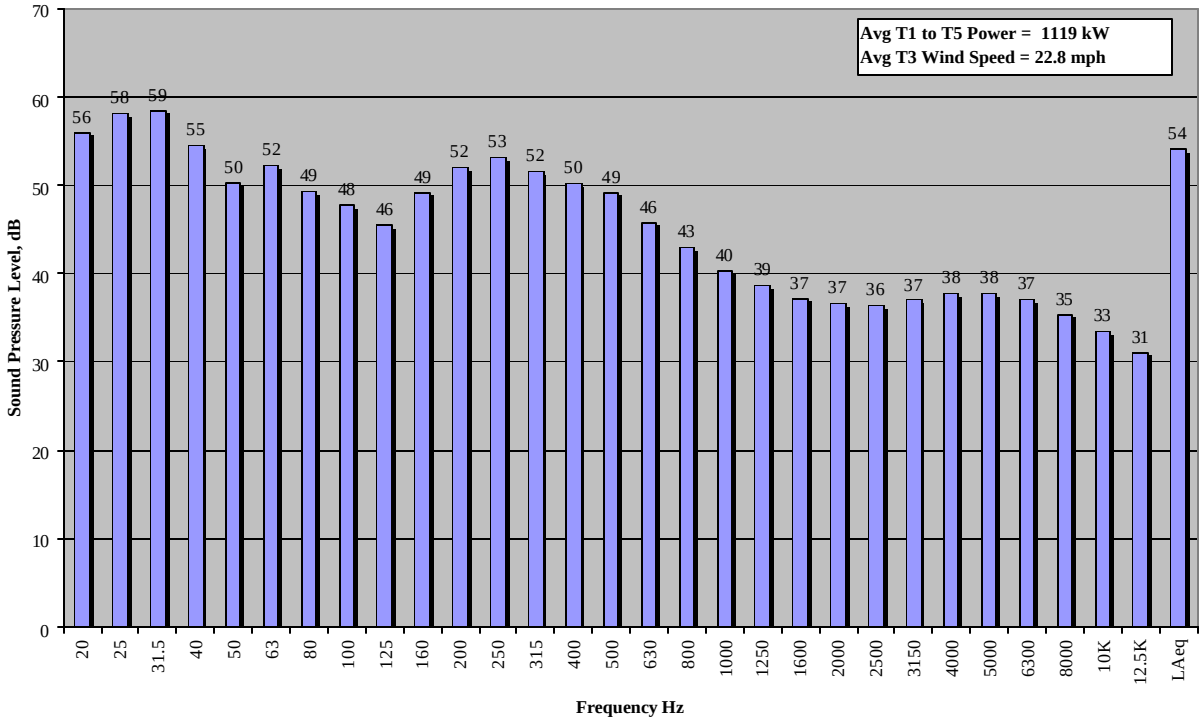
MP-1
4-Sept-07 22:00 to 23:00



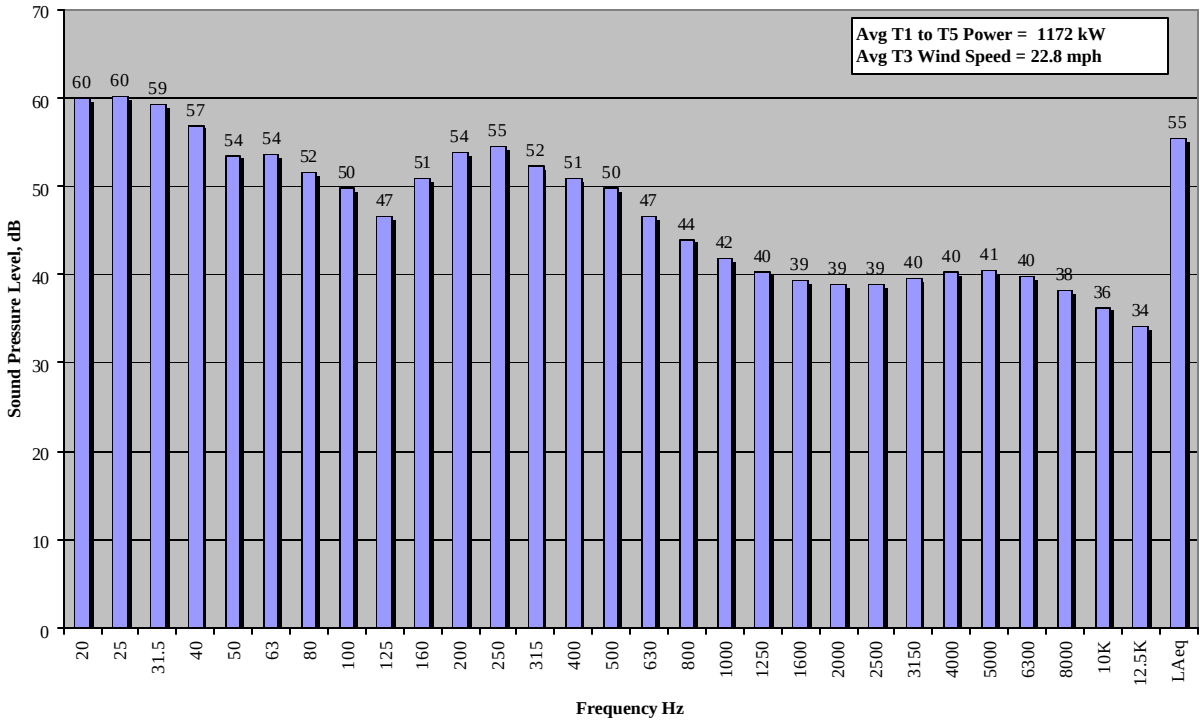
MP-1
4-Sept-07 23:00 to 00:00



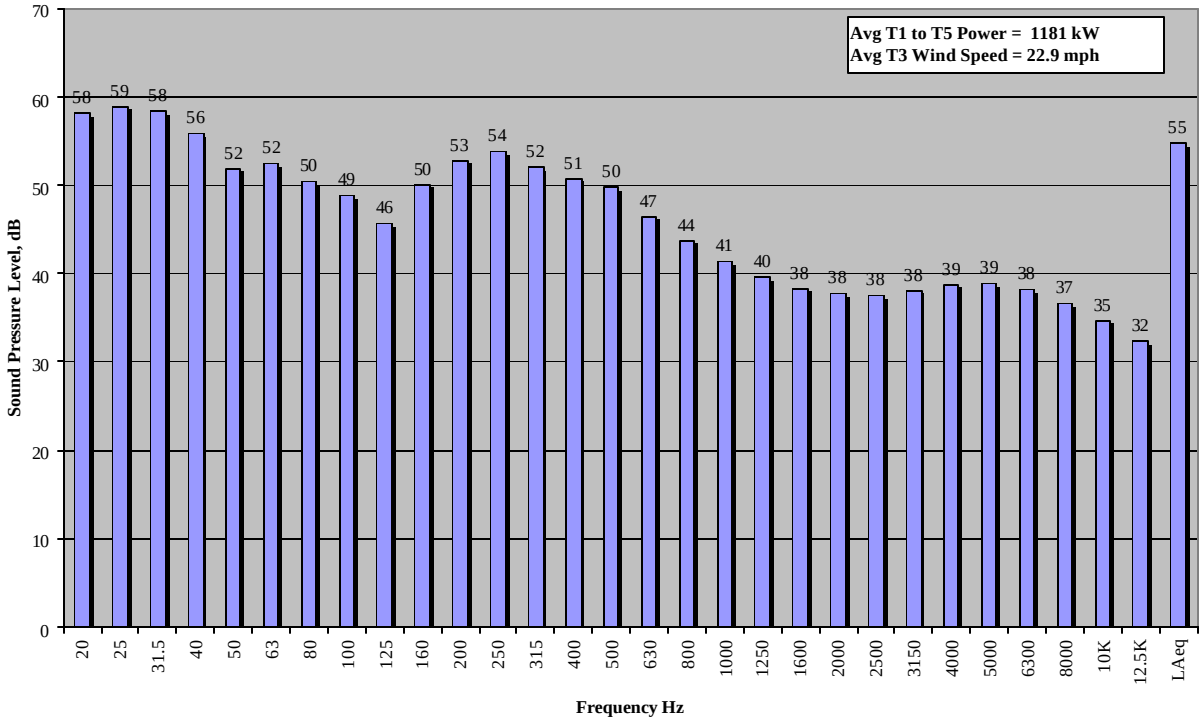
MP-1
5-Sept-07 00:00 to 01:00



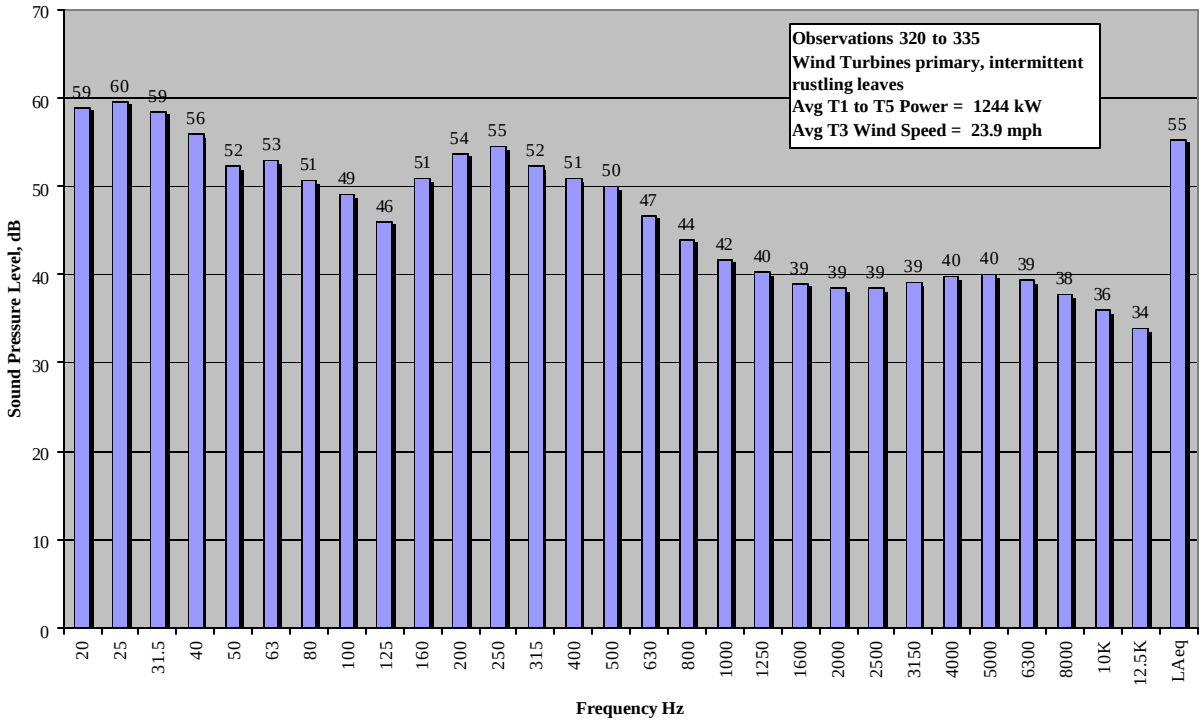
MP-1
5-Sept-07 01:00 to 02:00



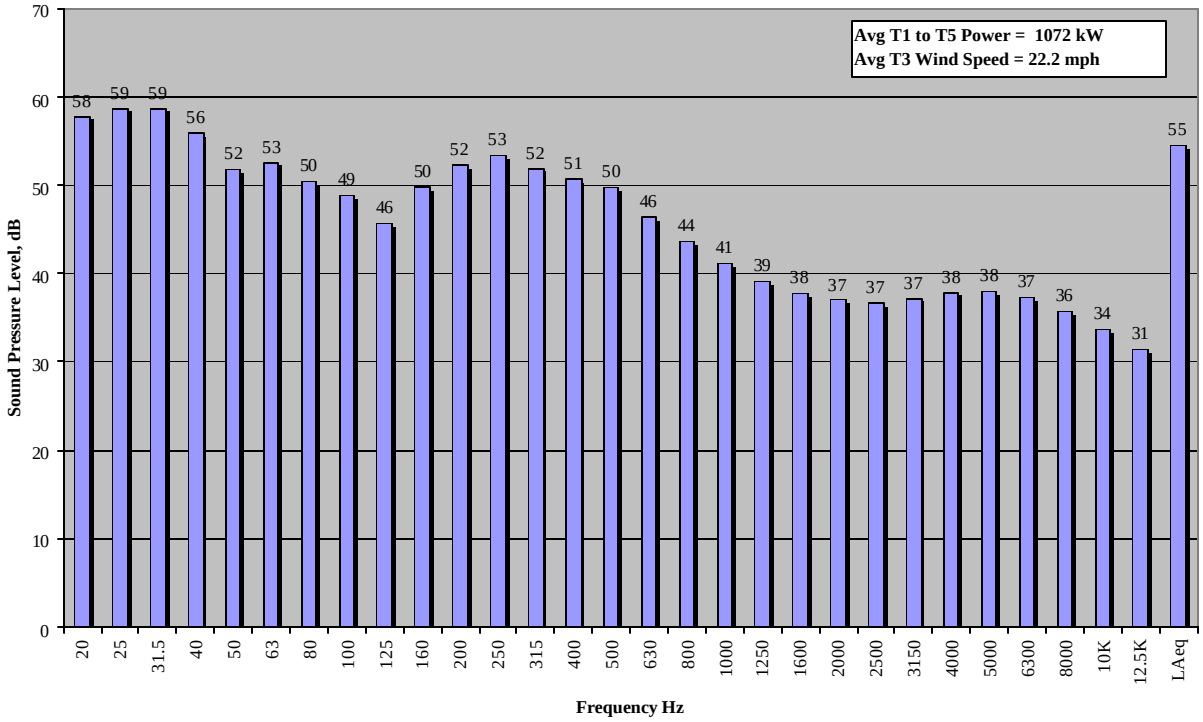
MP-1
5-Sept-07 02:00 to 03:00



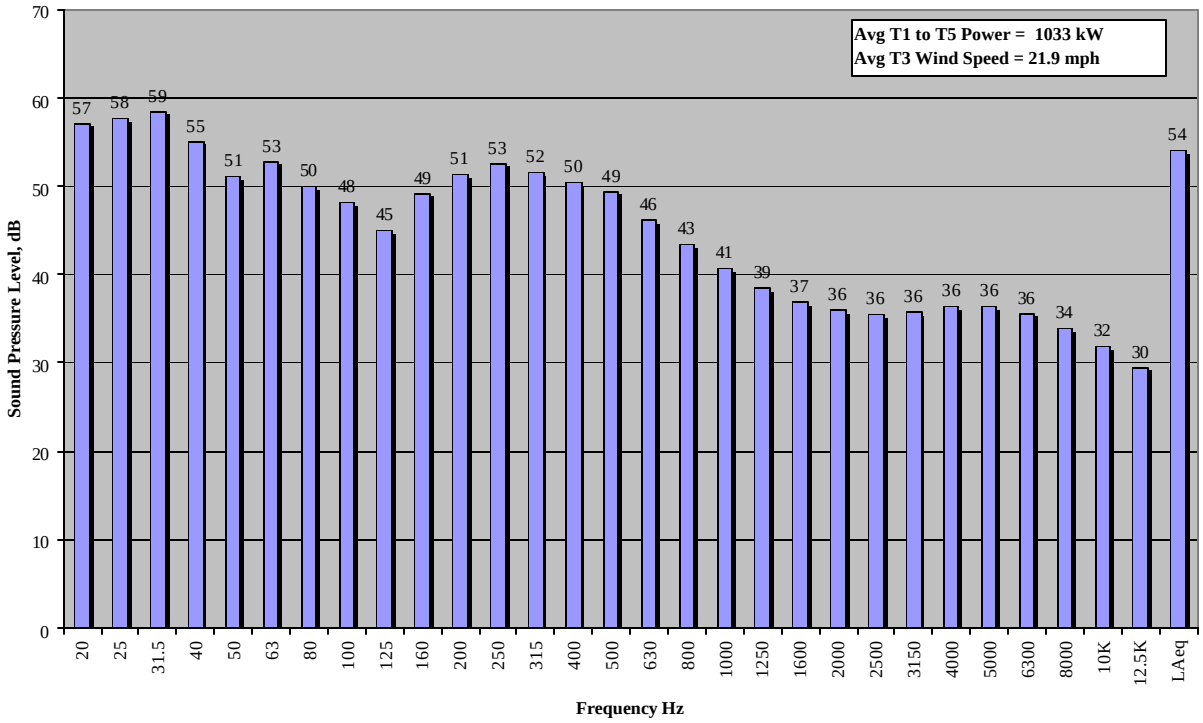
MP-1
5-Sept-07 03:00 to 04:00



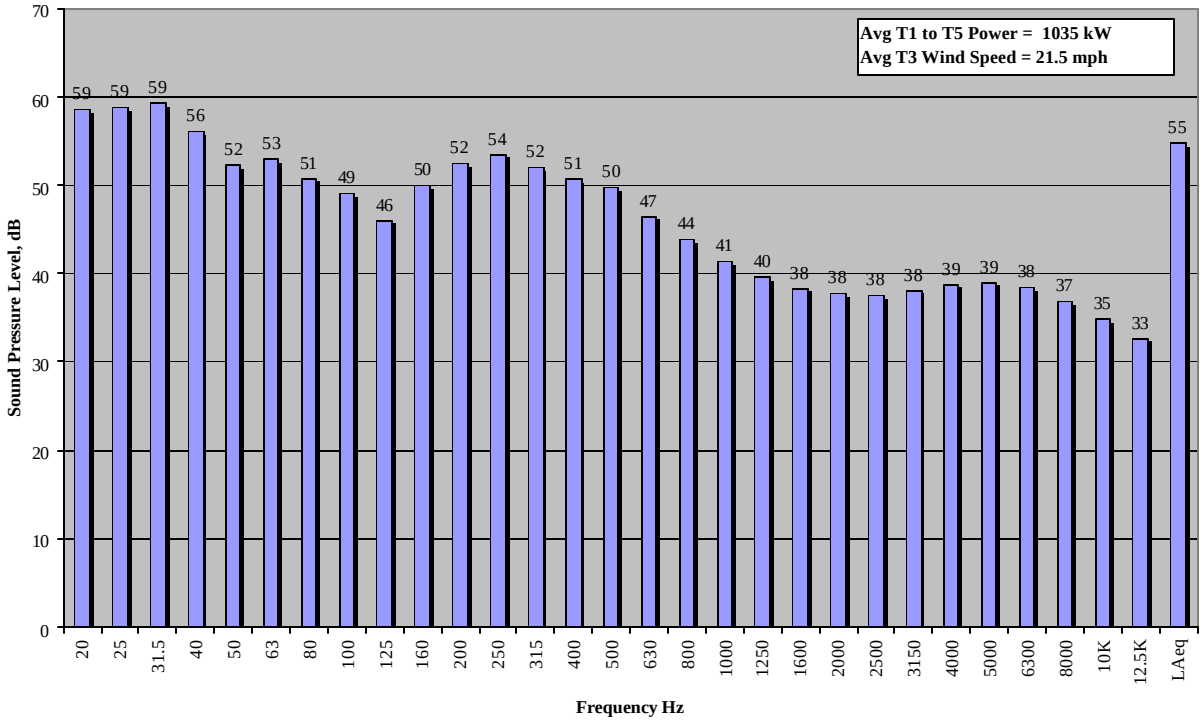
MP-1
5-Sept-07 04:00 to 05:00



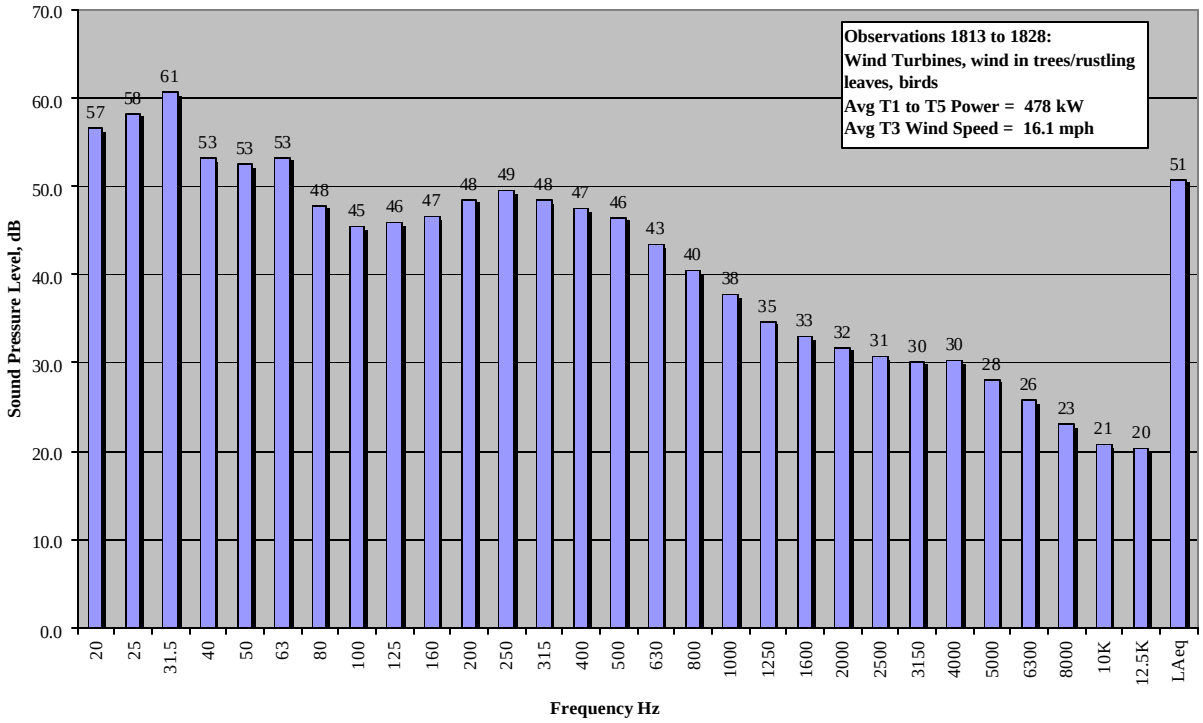
MP-1
5-Sept-07 05:00 to 06:00



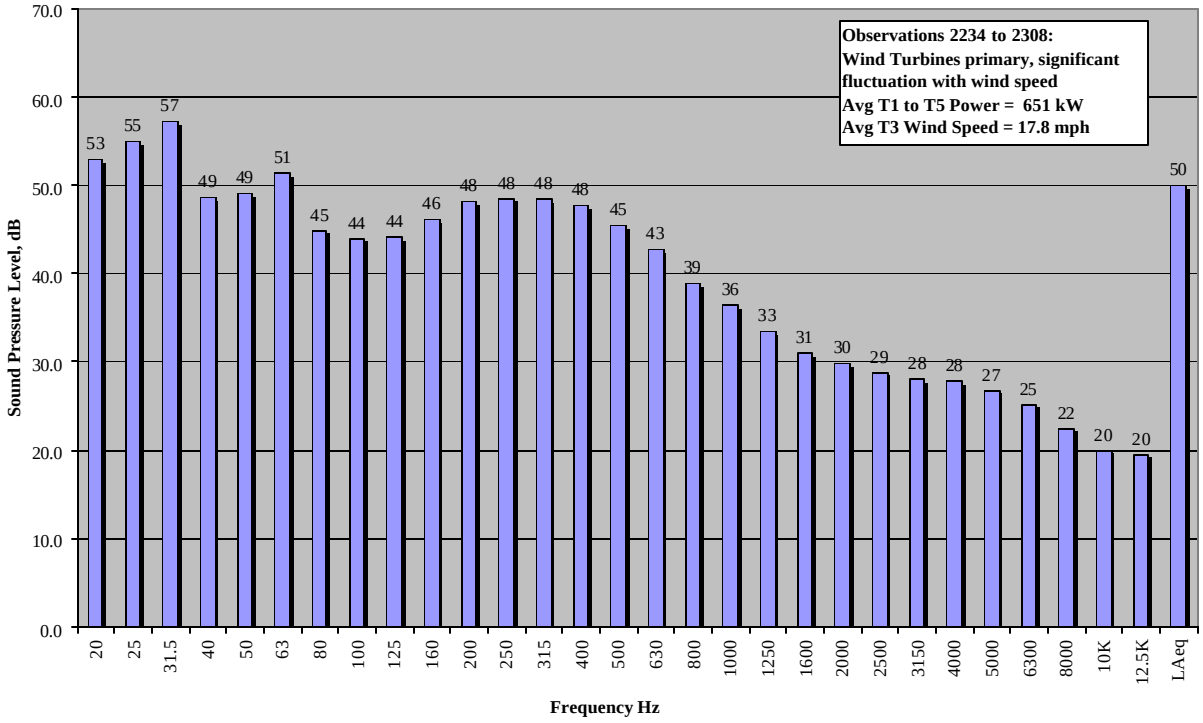
MP-1
5-Sept-07 06:00 to 07:00



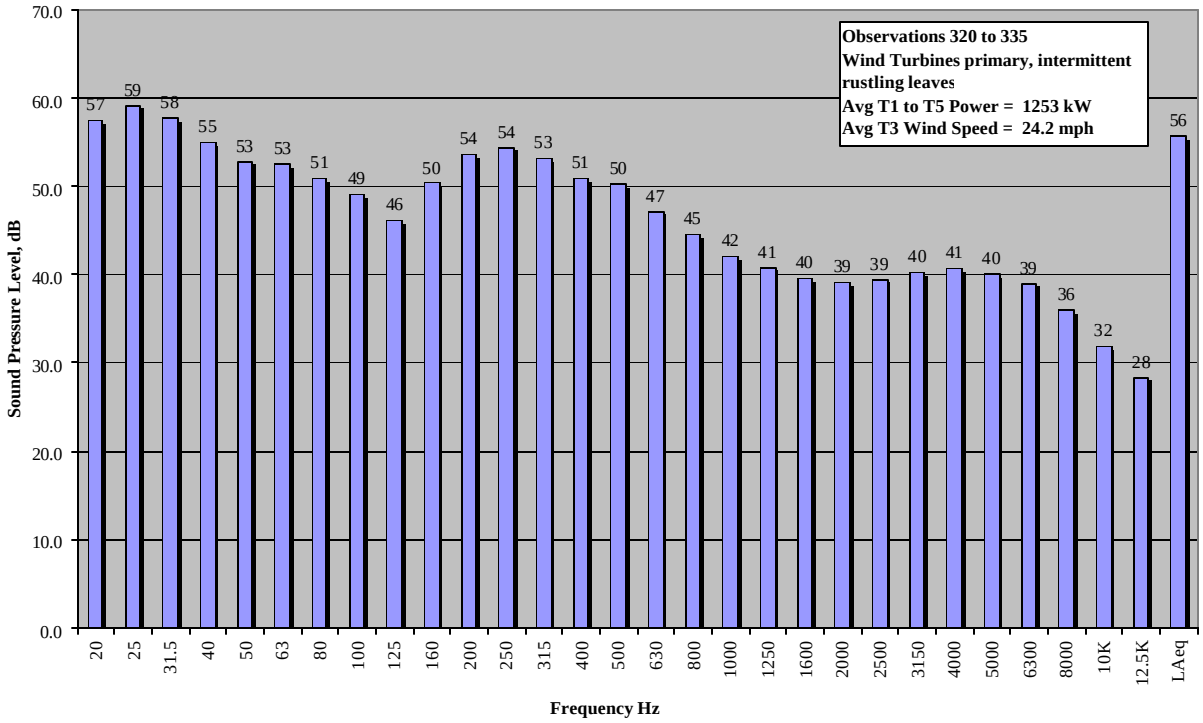
MP-1
4-Sept-07 18:12 to 18:27



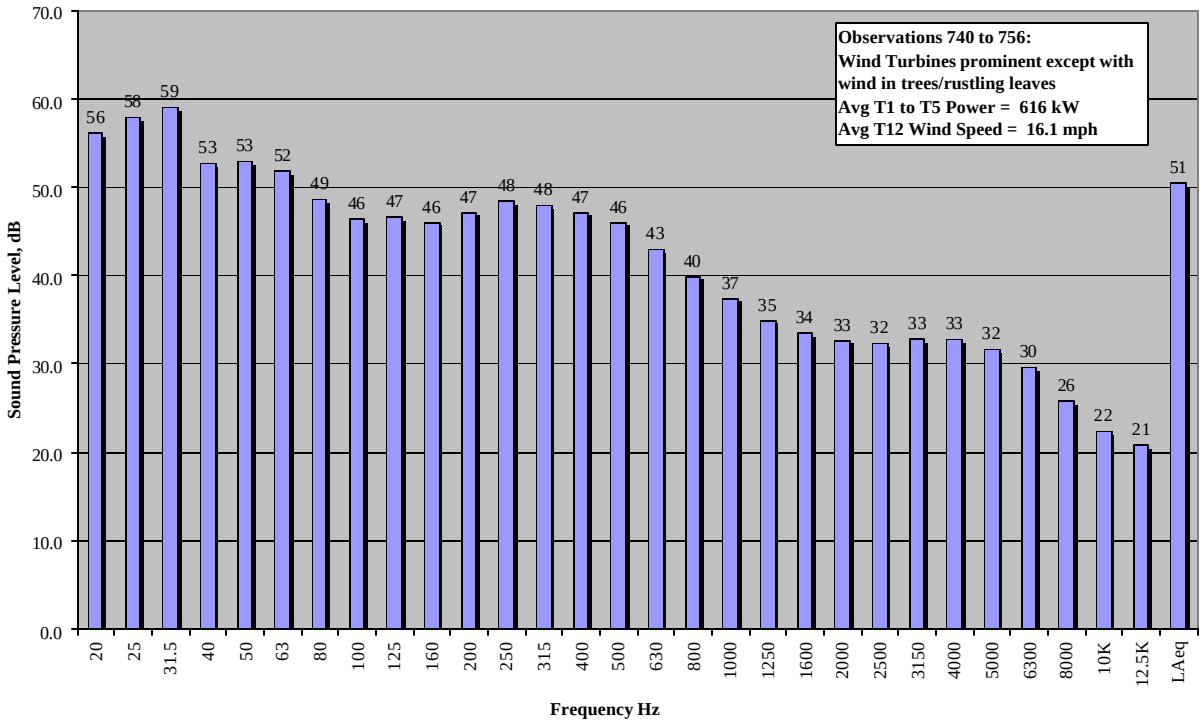
MP-1
4-Sept-07 22:34 to 23:08



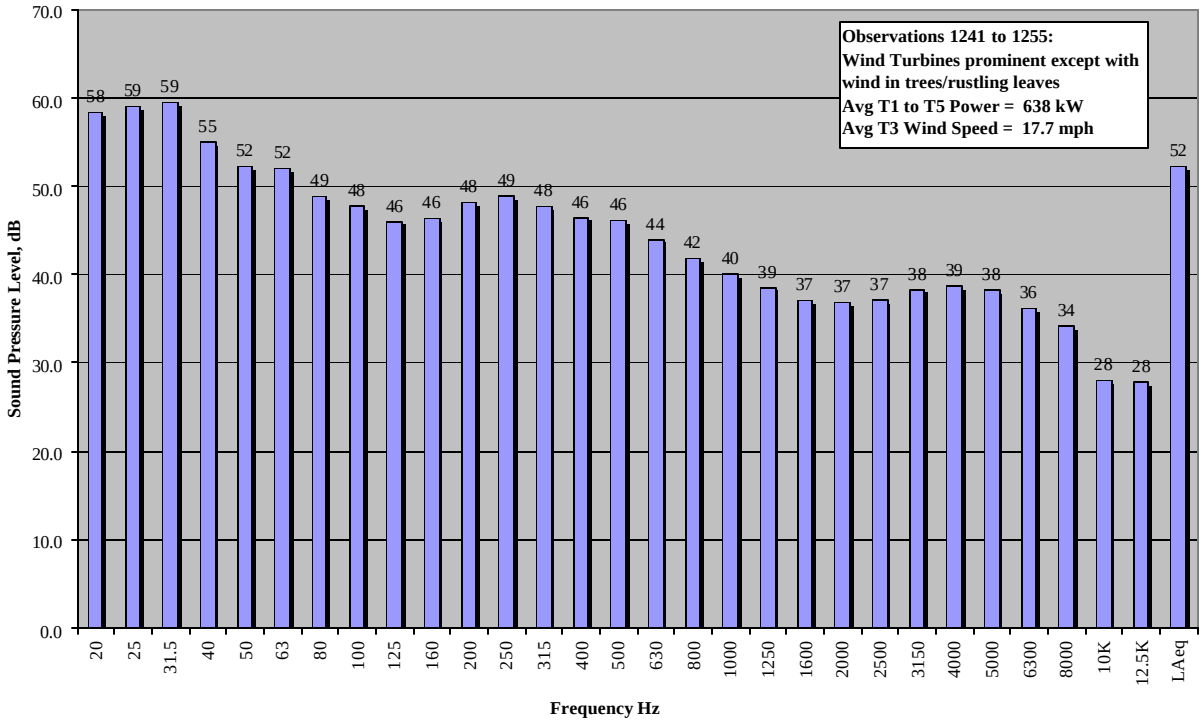
MP-1
5-Sept-07 03:20 to 03:35



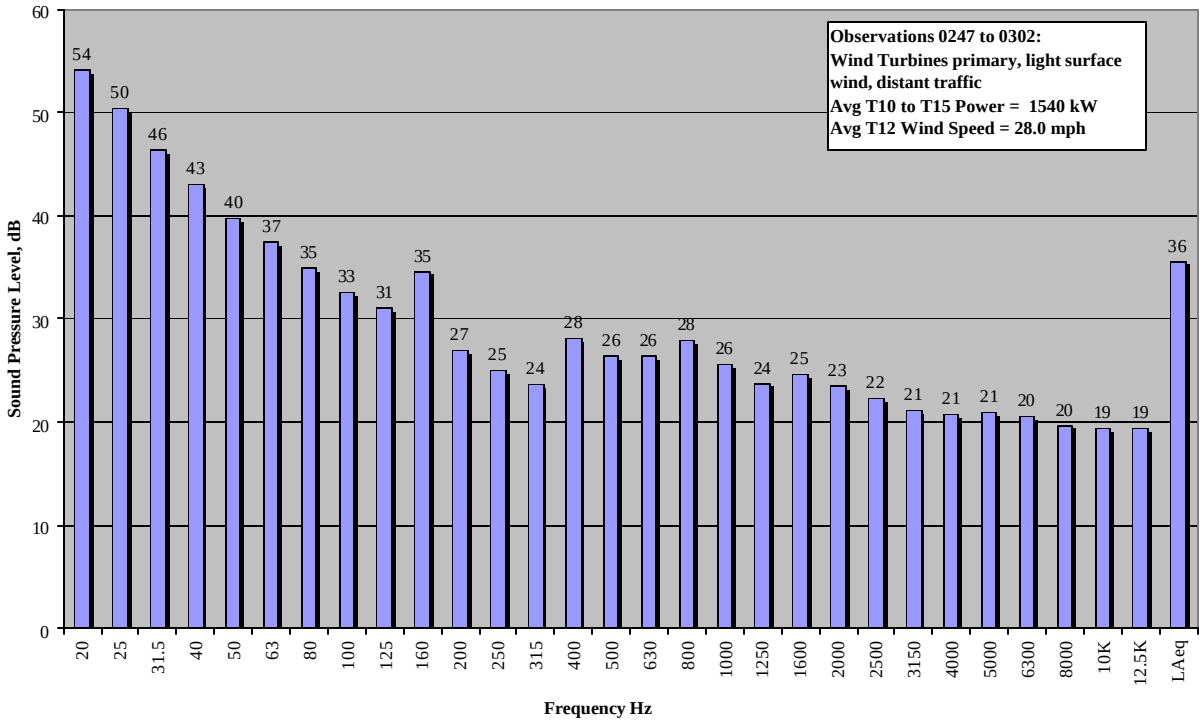
MP-1
5-Sept-07 07:40 to 07:56



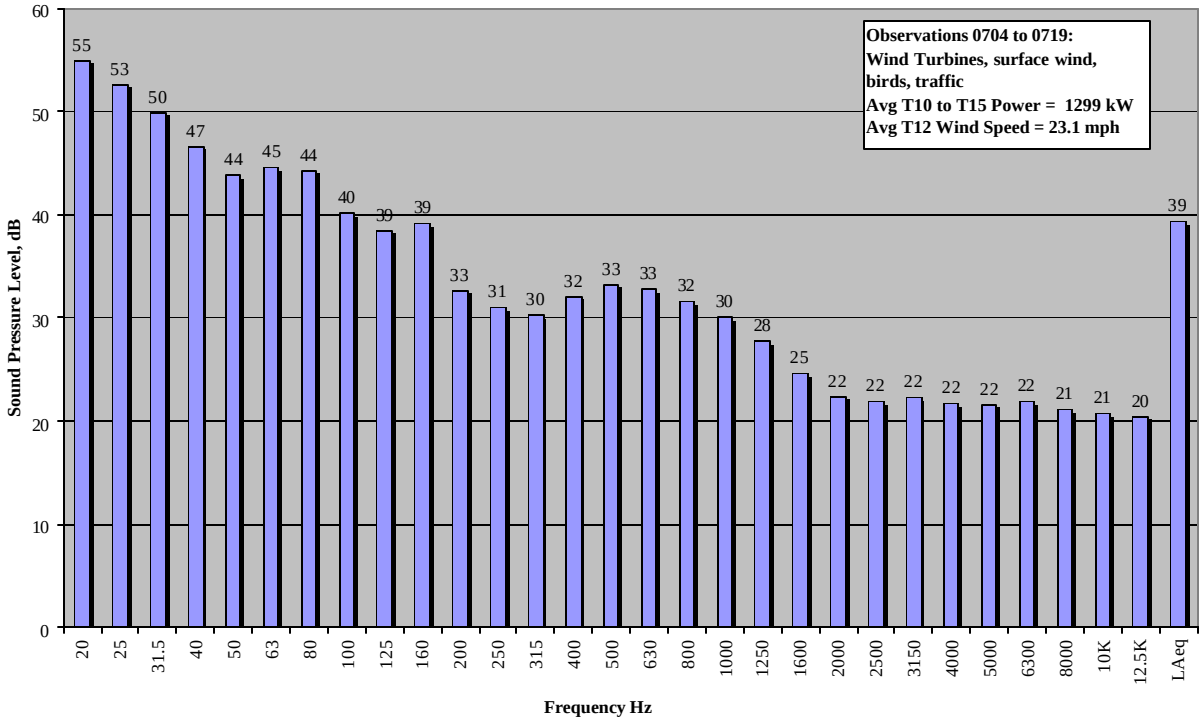
MP-1
5-Sept-07 12:41 to 12:55



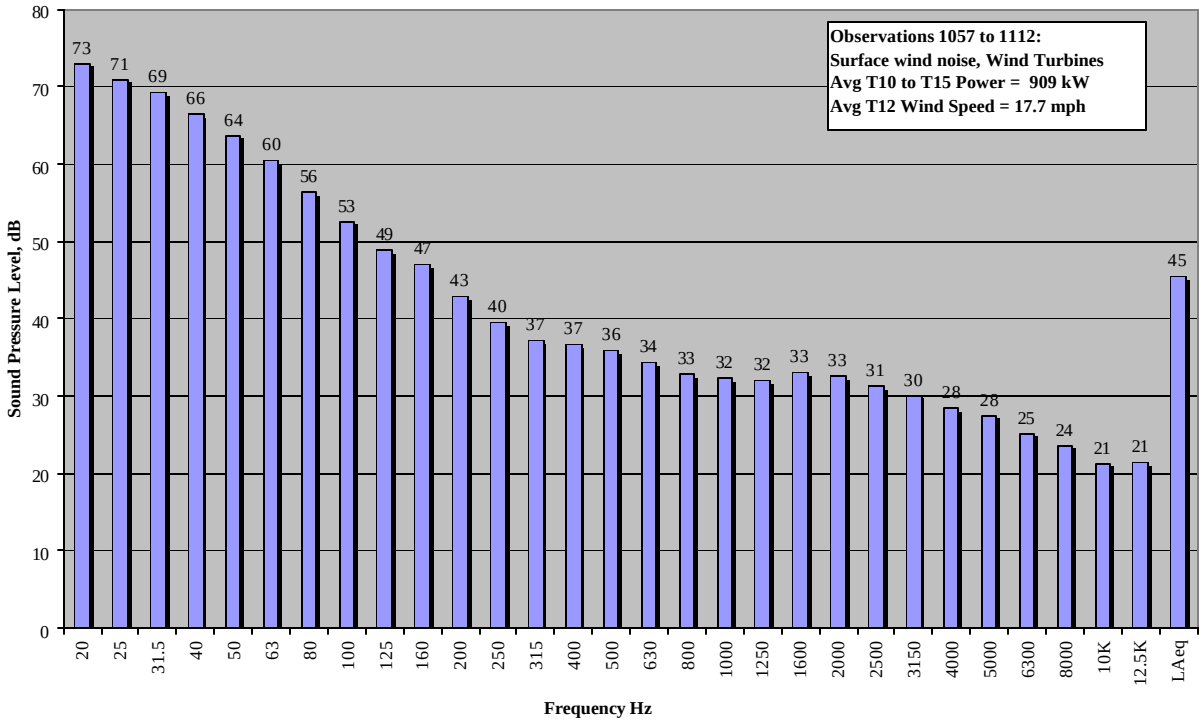
MP-2
5-Sept-07 02:47 to 03:02



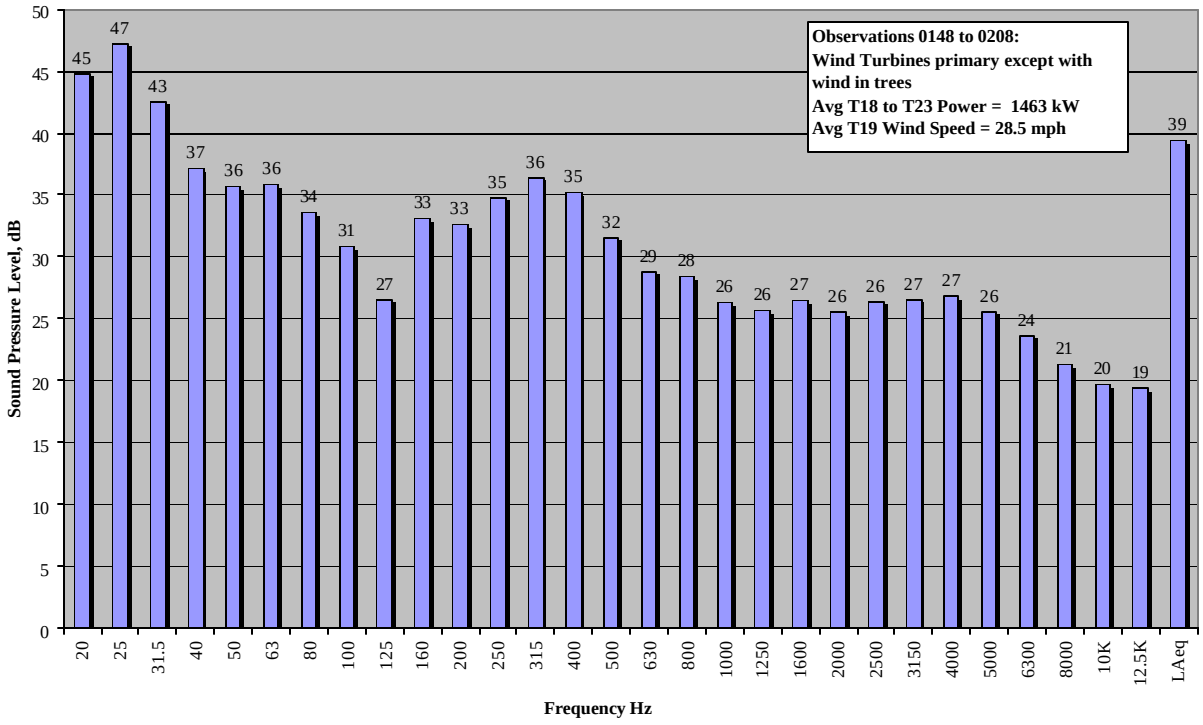
MP-2
5-Sept-07 07:04 to 07:19



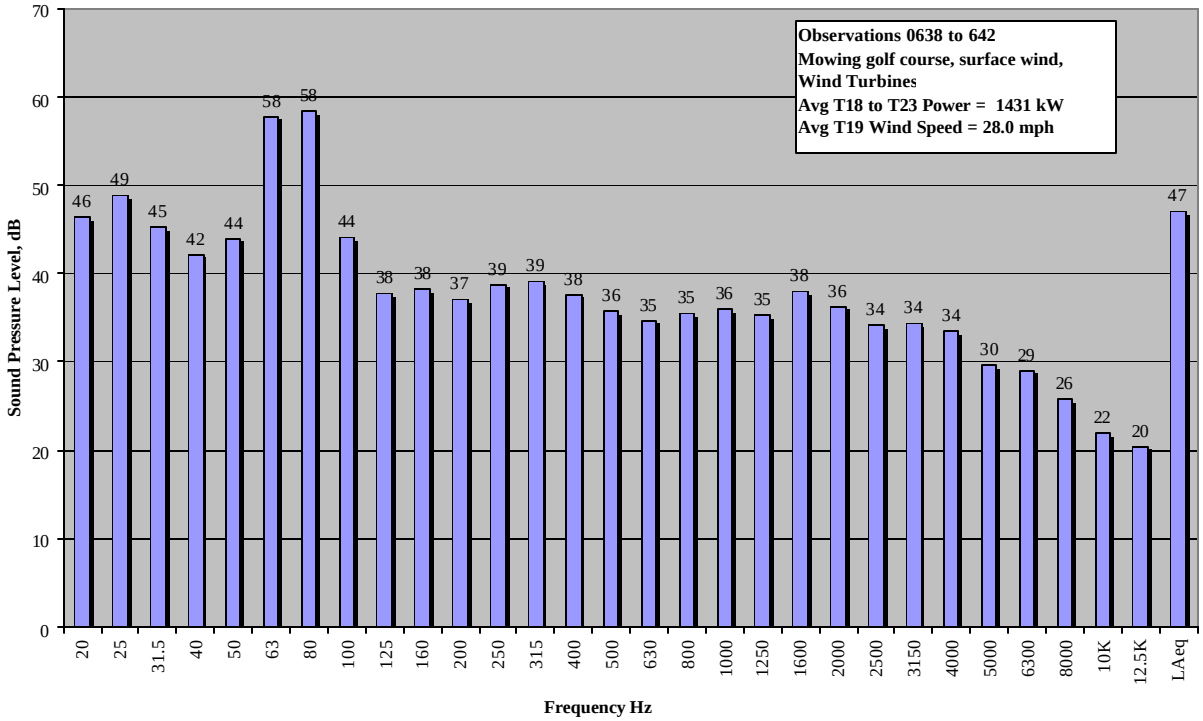
MP-2
5-Sept-07 10:57 to 11:12



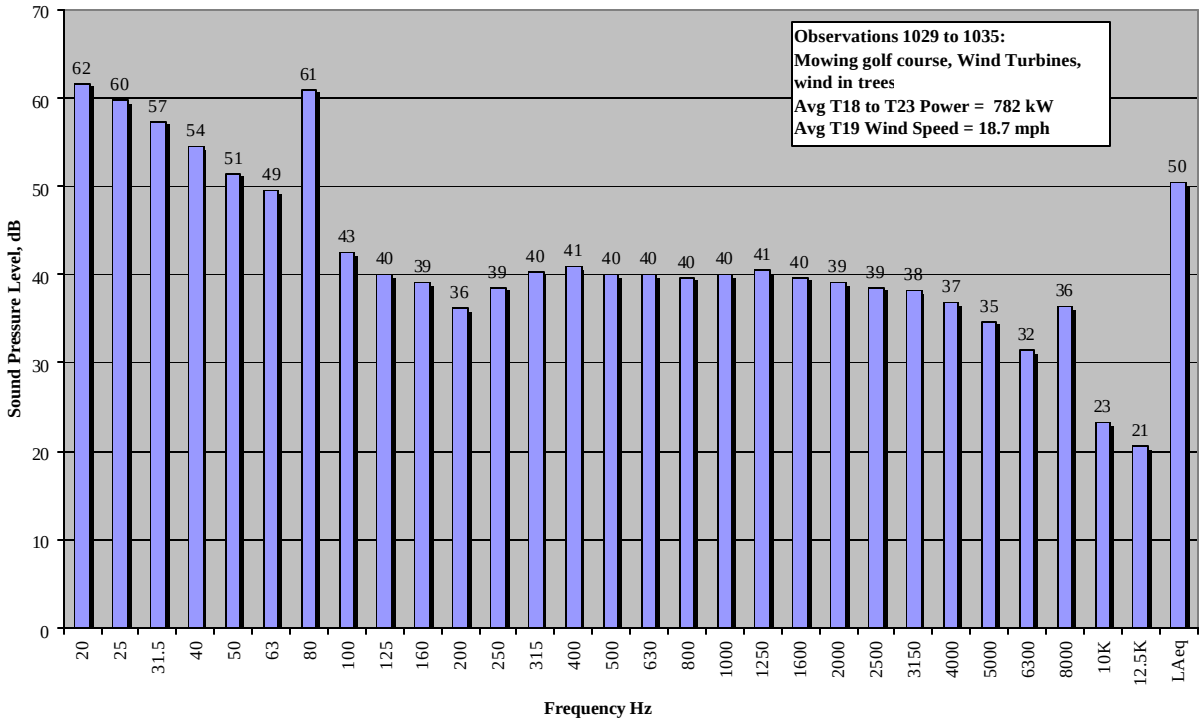
MP-4A
5-Sept-07 01:48 to 02:08



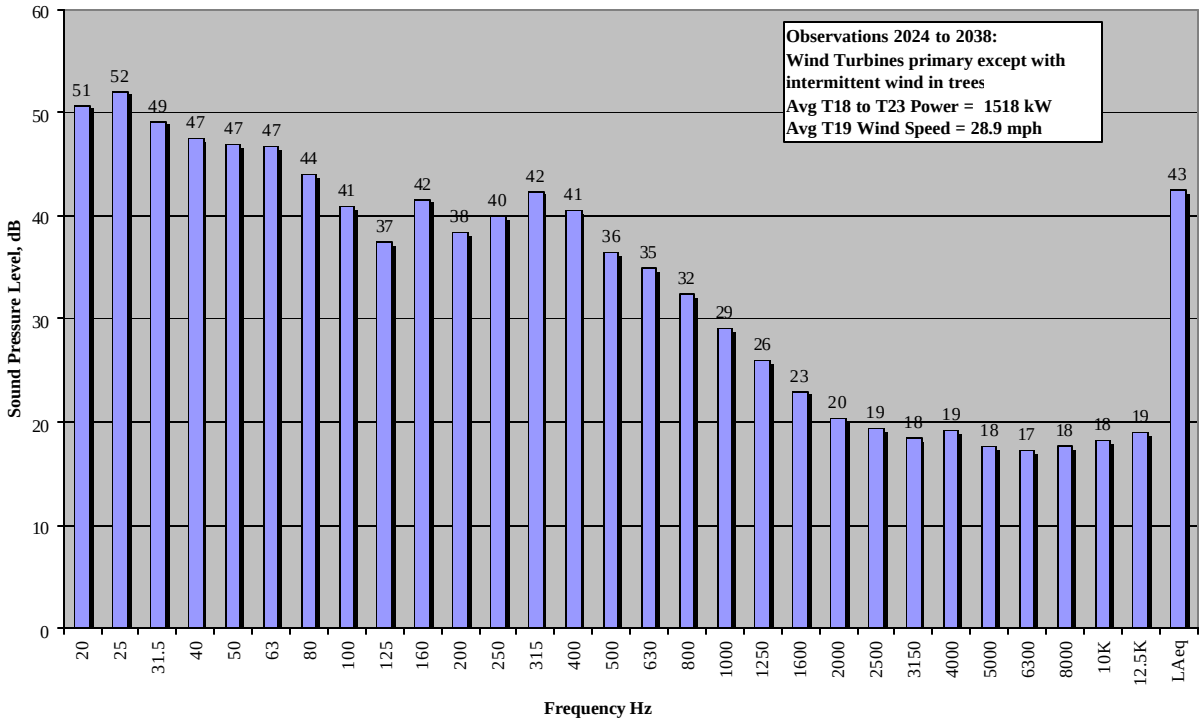
MP-4A
5-Sept-07 06:38 to 6:42



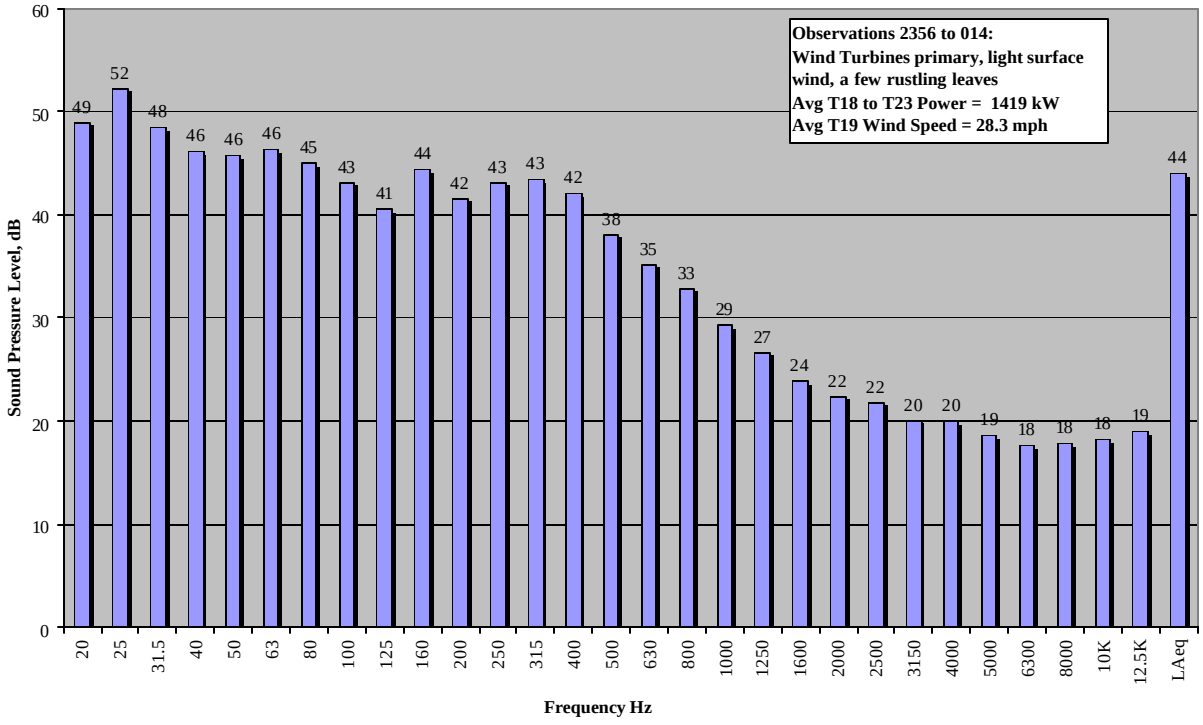
MP-4A
5-Sept-07 10:29 to 10:35



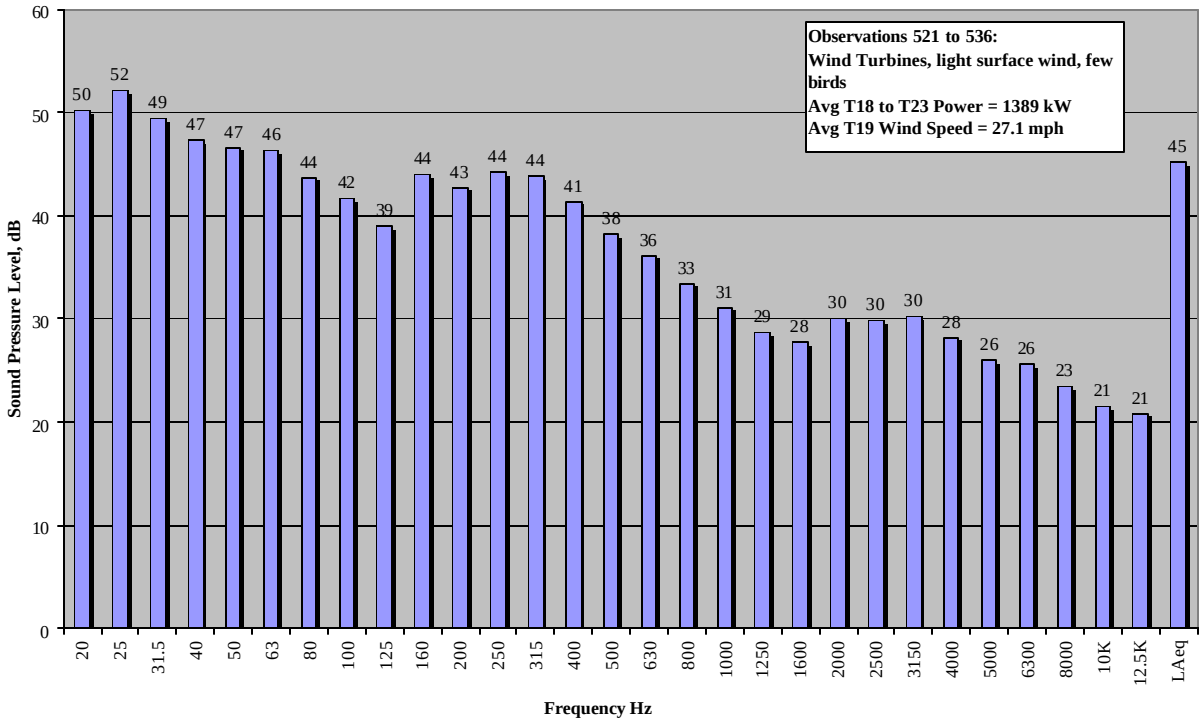
MP-5
4-Sept-07 20:24 to 20:38



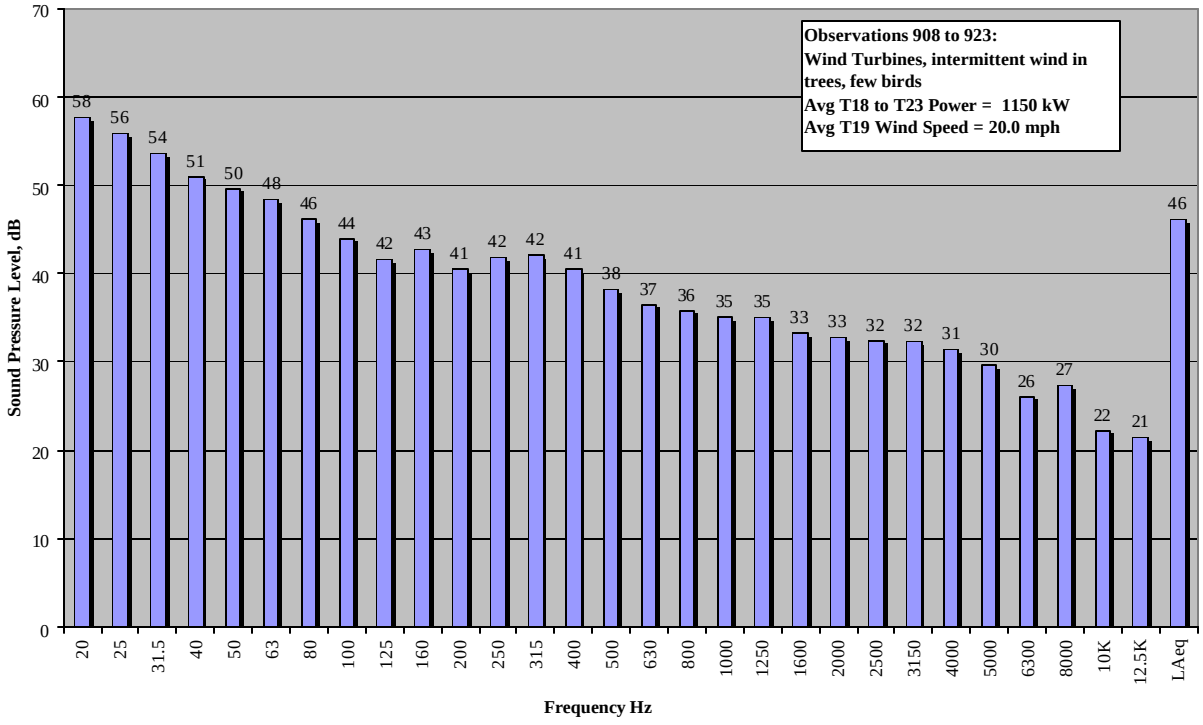
MP-5
4-Sept-07 23:56 to 0:14



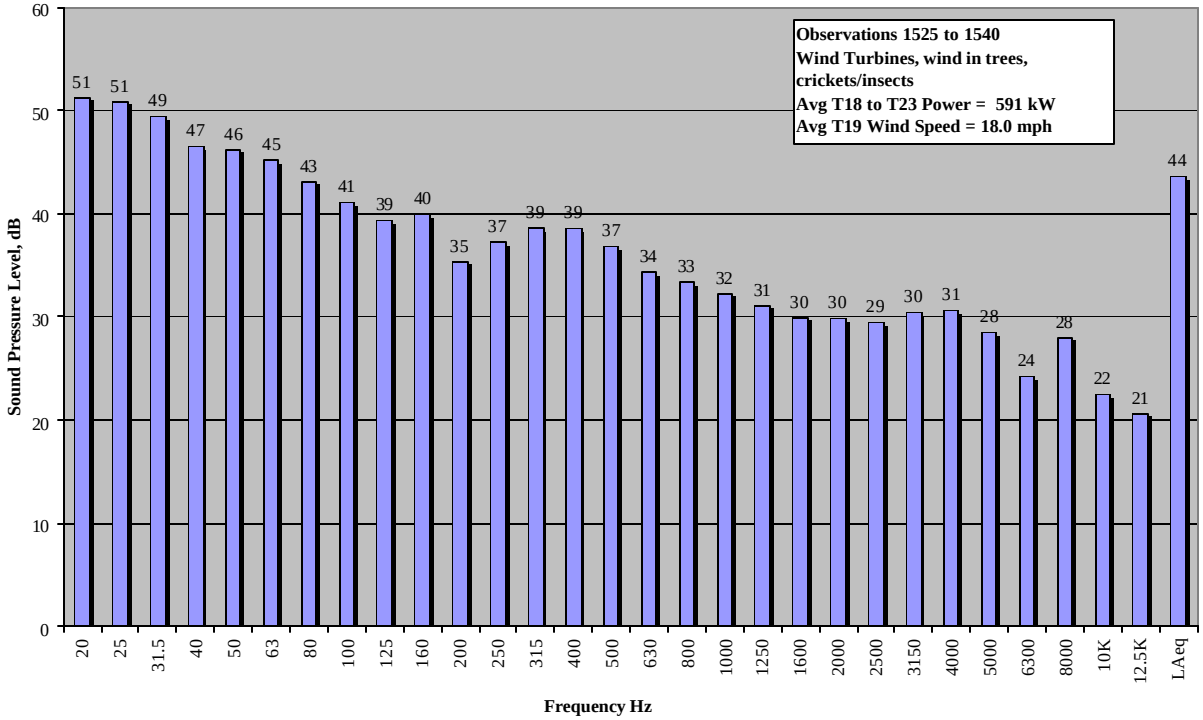
MP-5
5-Sept-07 5:21 to 5:36



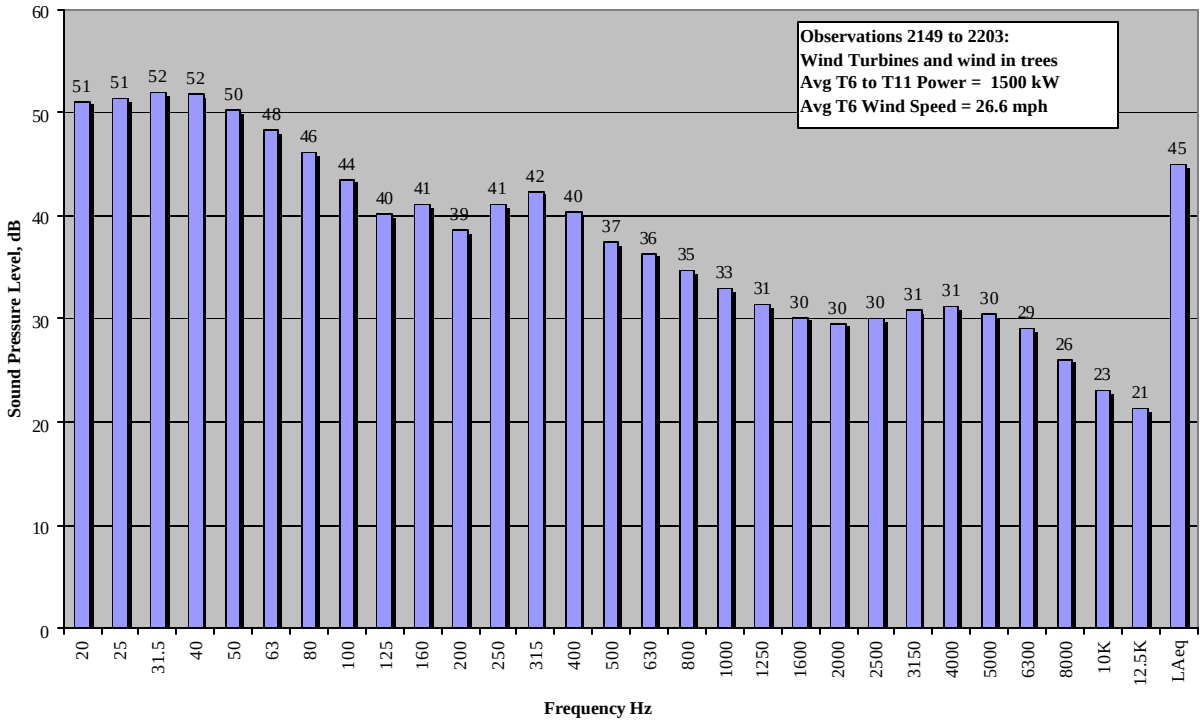
MP-5
5-Sept-07 9:08 to 9:23



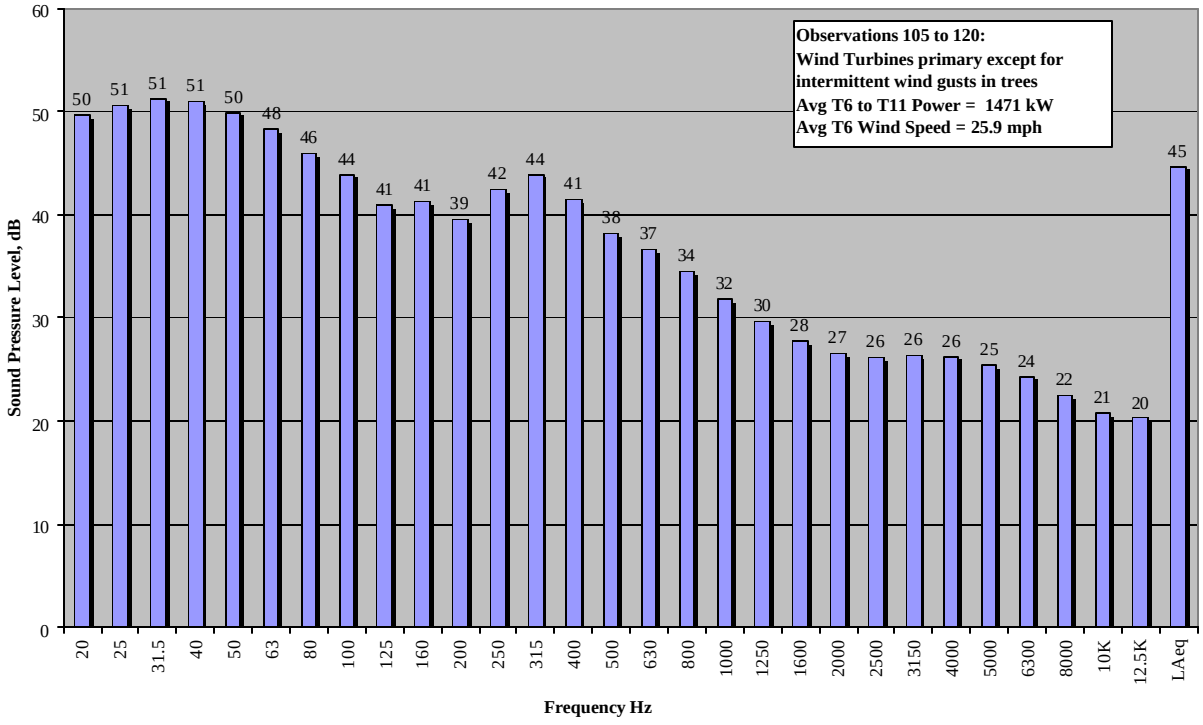
MP-5
5-Sept-07 15:25 to 15:40



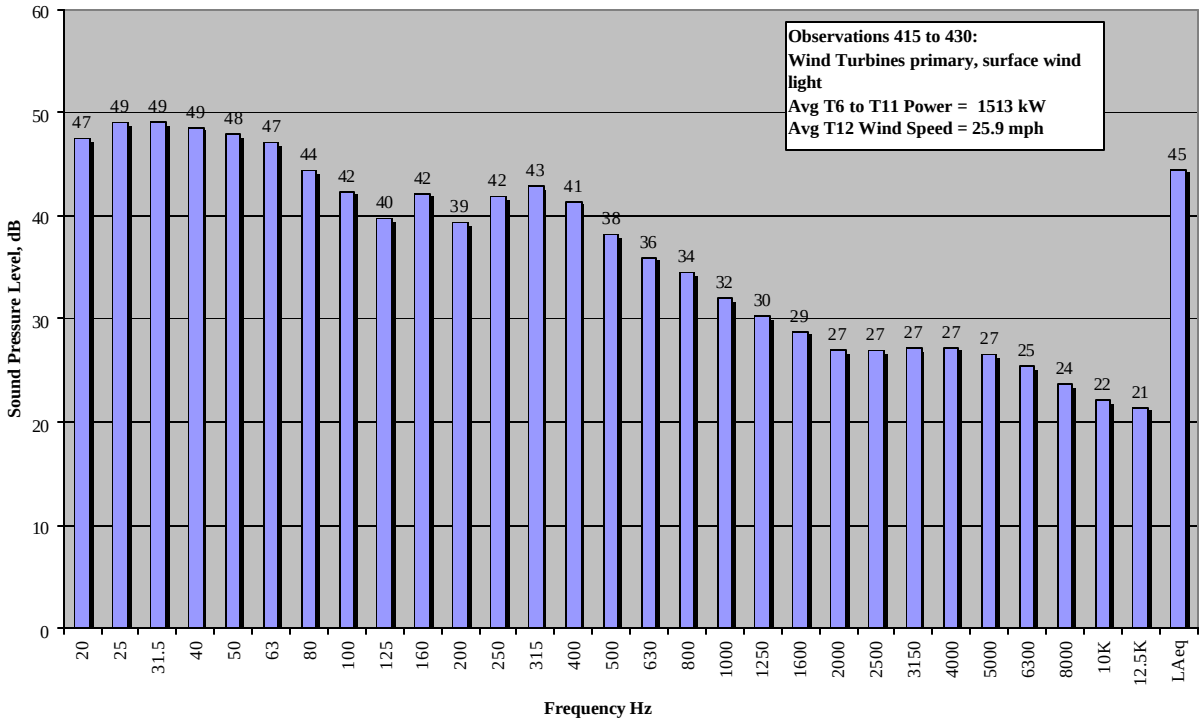
MP-6A
4-Sept-07 21:49 to 22:03



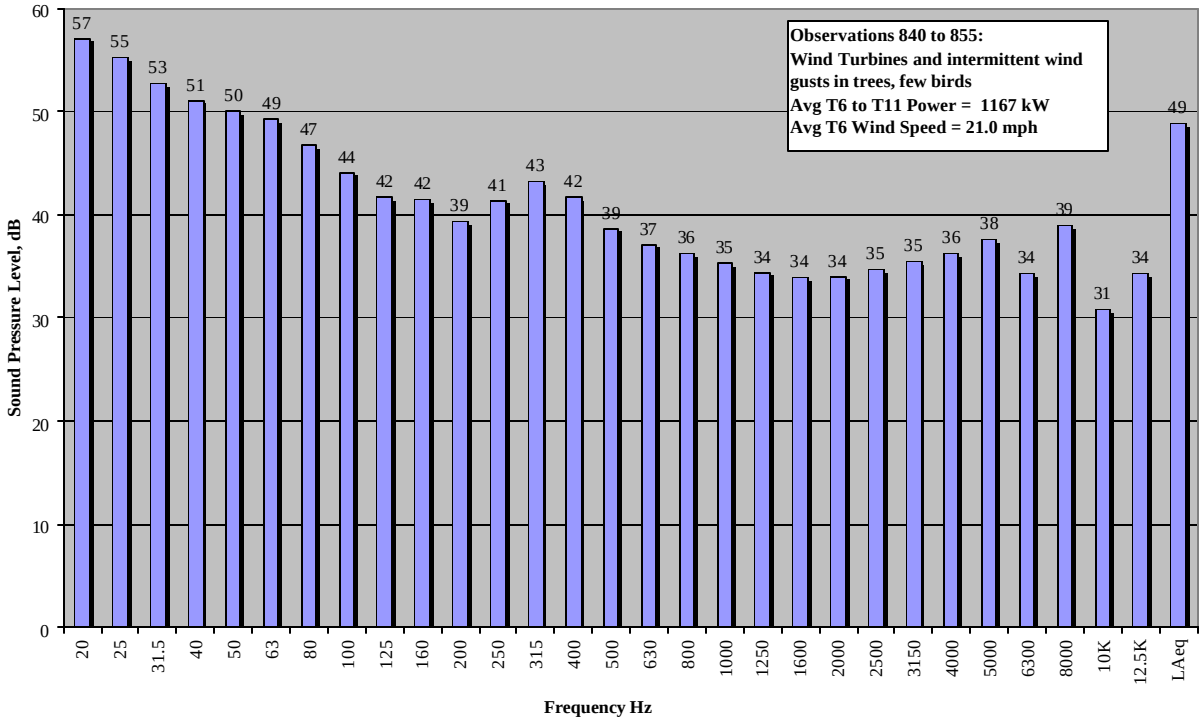
MP-6A
5-Sept-07 1:05 to 1:20



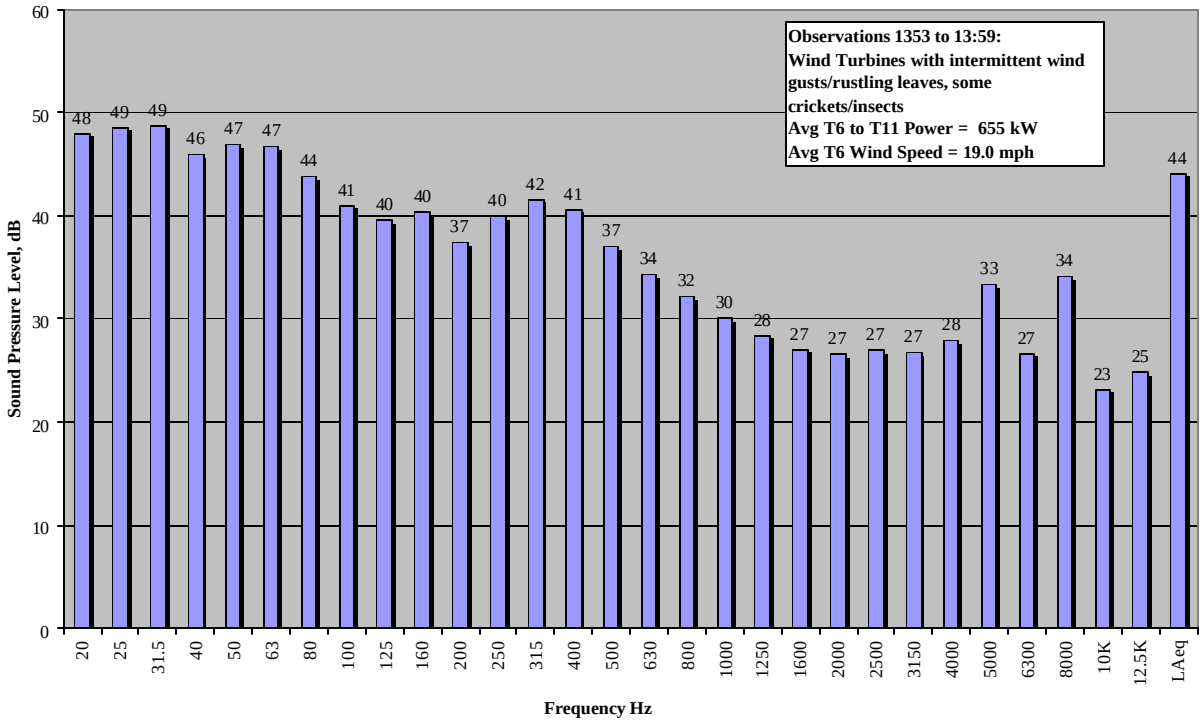
MP-6A
5-Sept-07 4:15 to 4:30



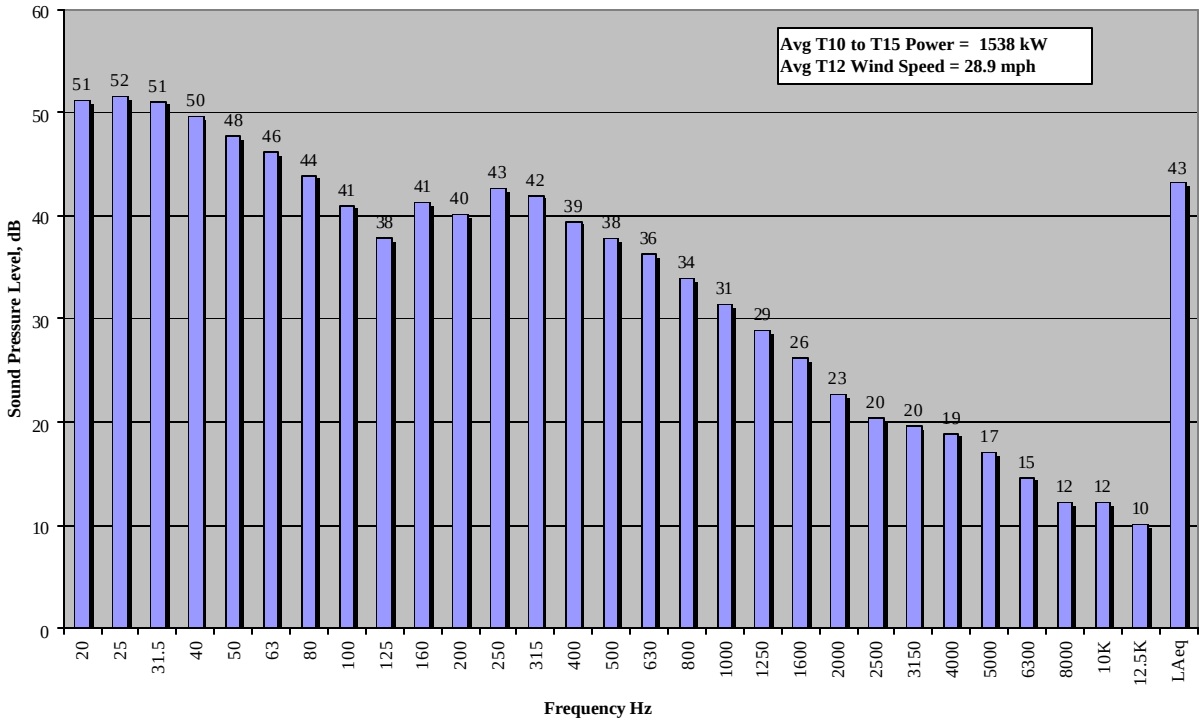
MP-6A
5-Sept-07 8:40 to 8:55



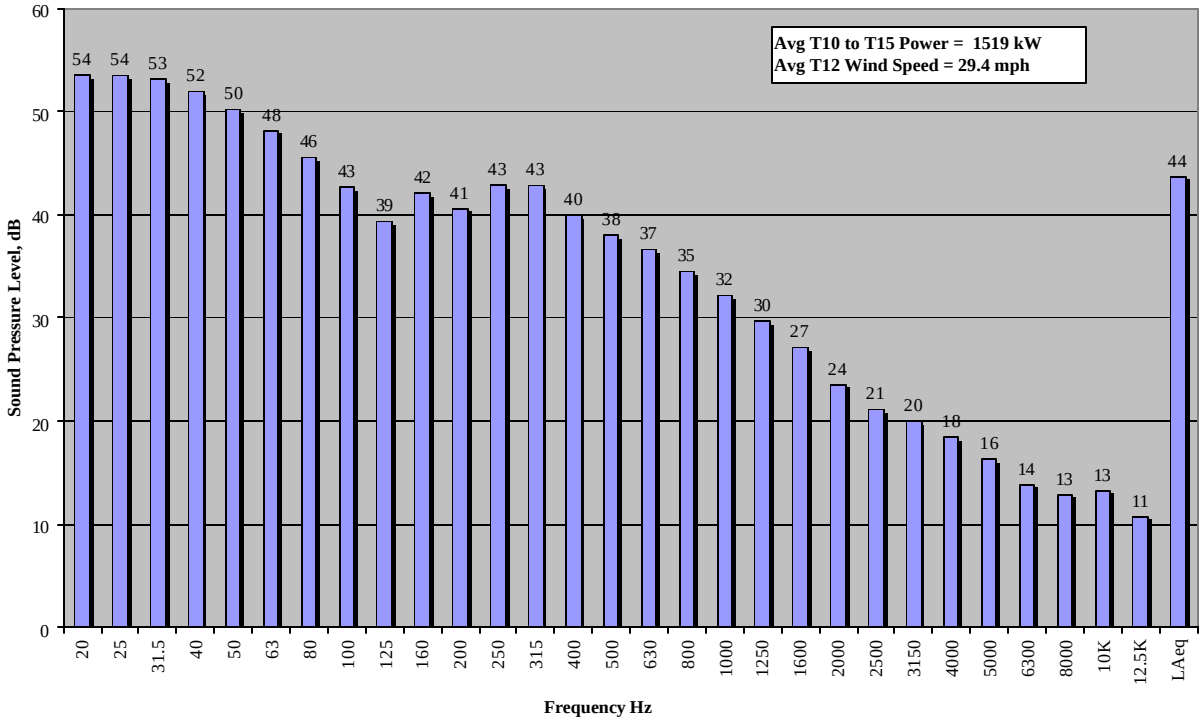
MP-6A
5-Sept-07 13:53 to 13:59



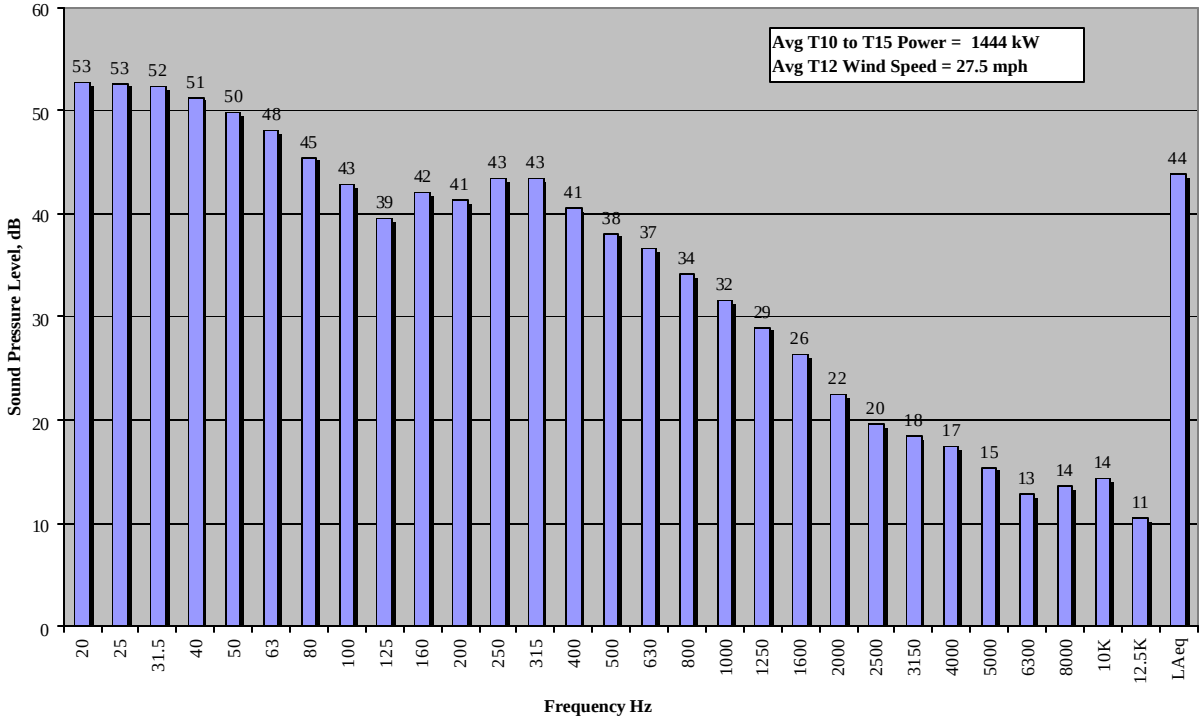
MP-7A
4-Sept-07 20:00 to 21:00



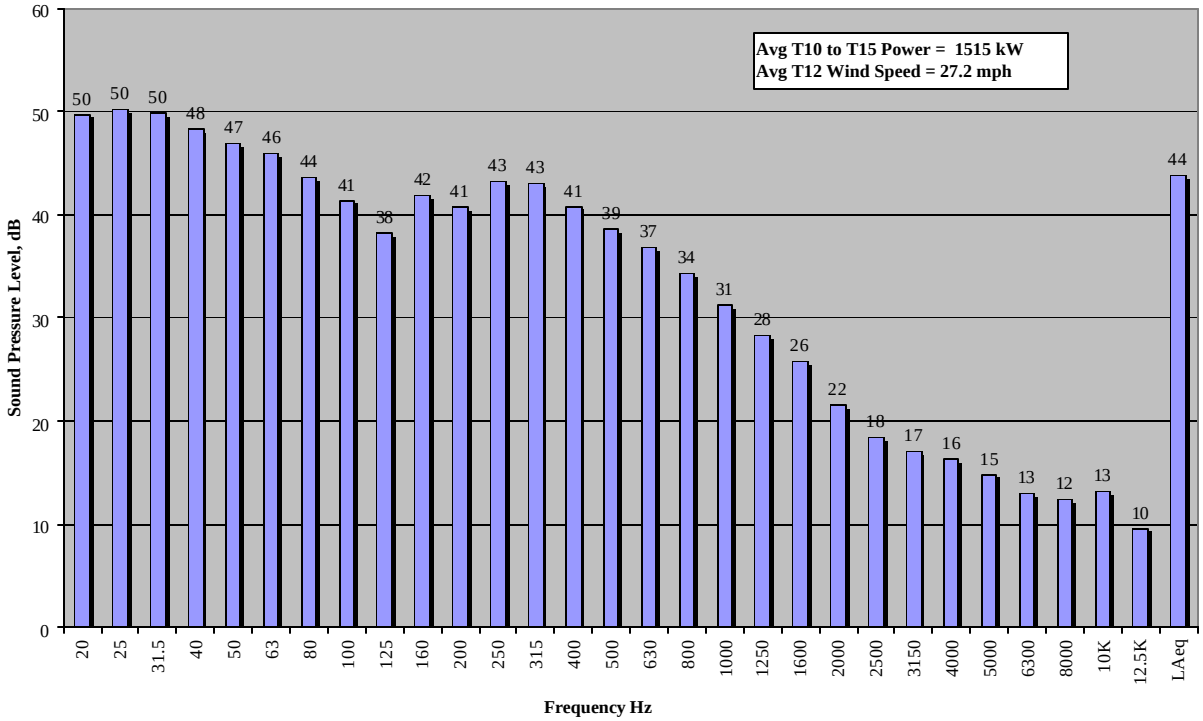
MP-7A
4-Sept-07 21:00 to 22:00



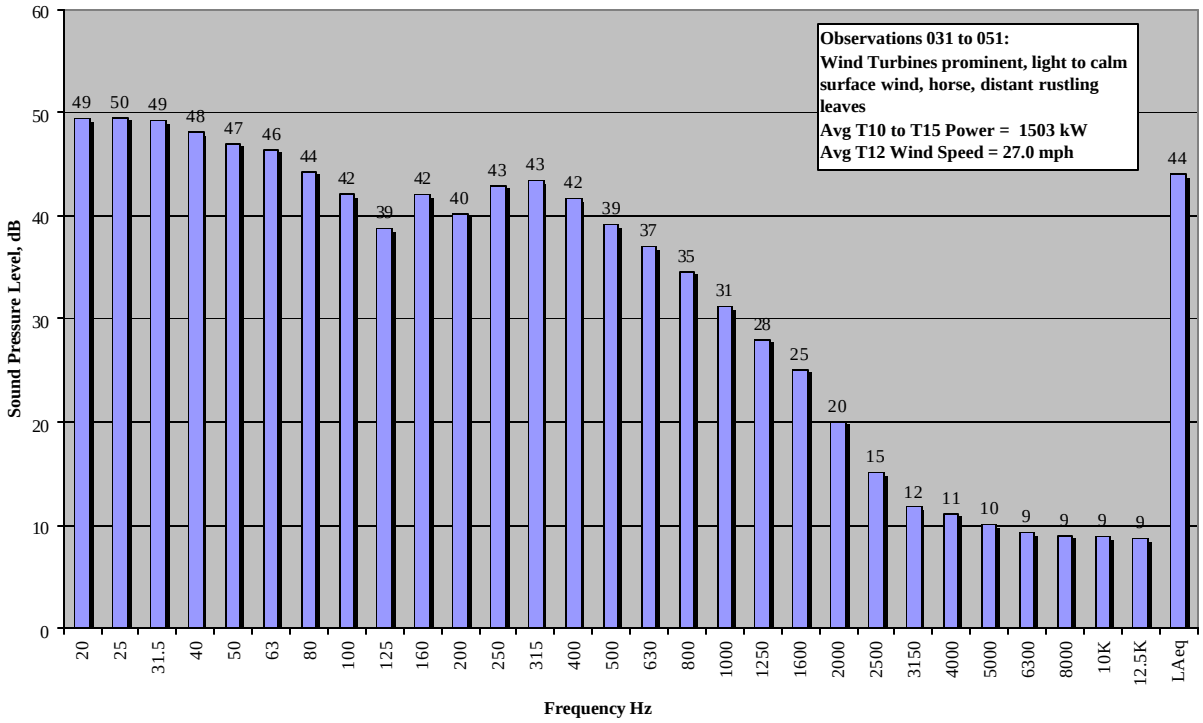
MP-7A
4-Sept-07 22:00 to 23:00



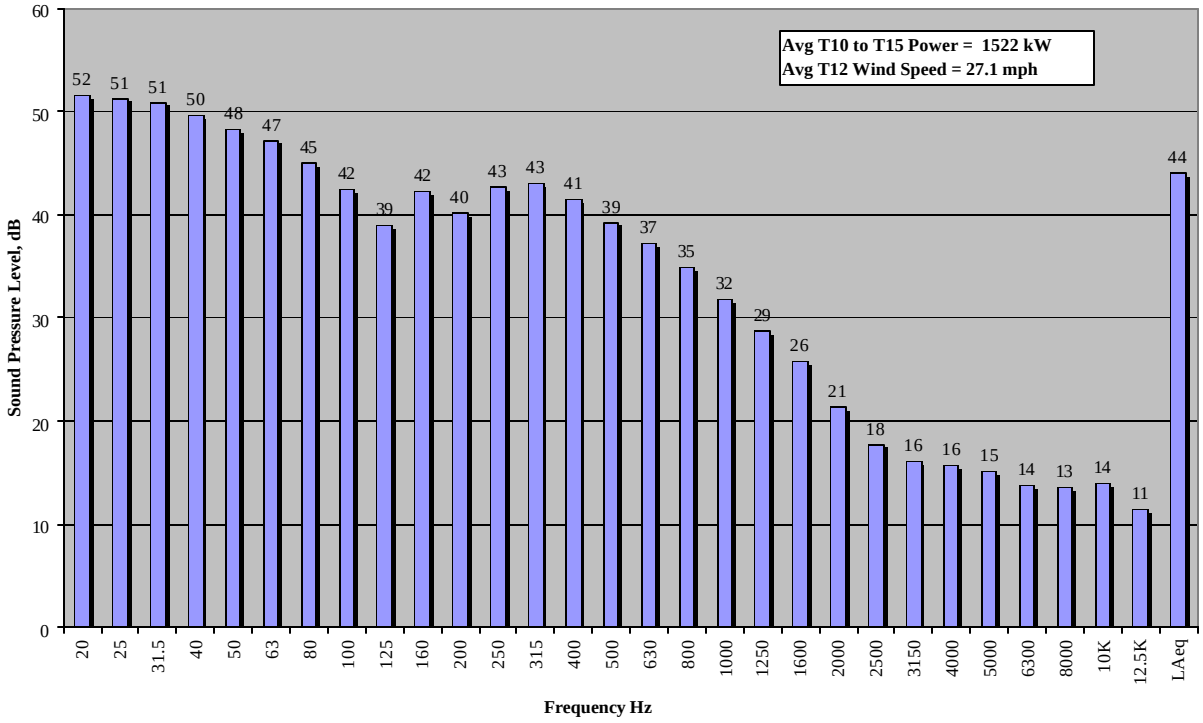
MP-7A
4-Sept-07 23:00 to 00:00



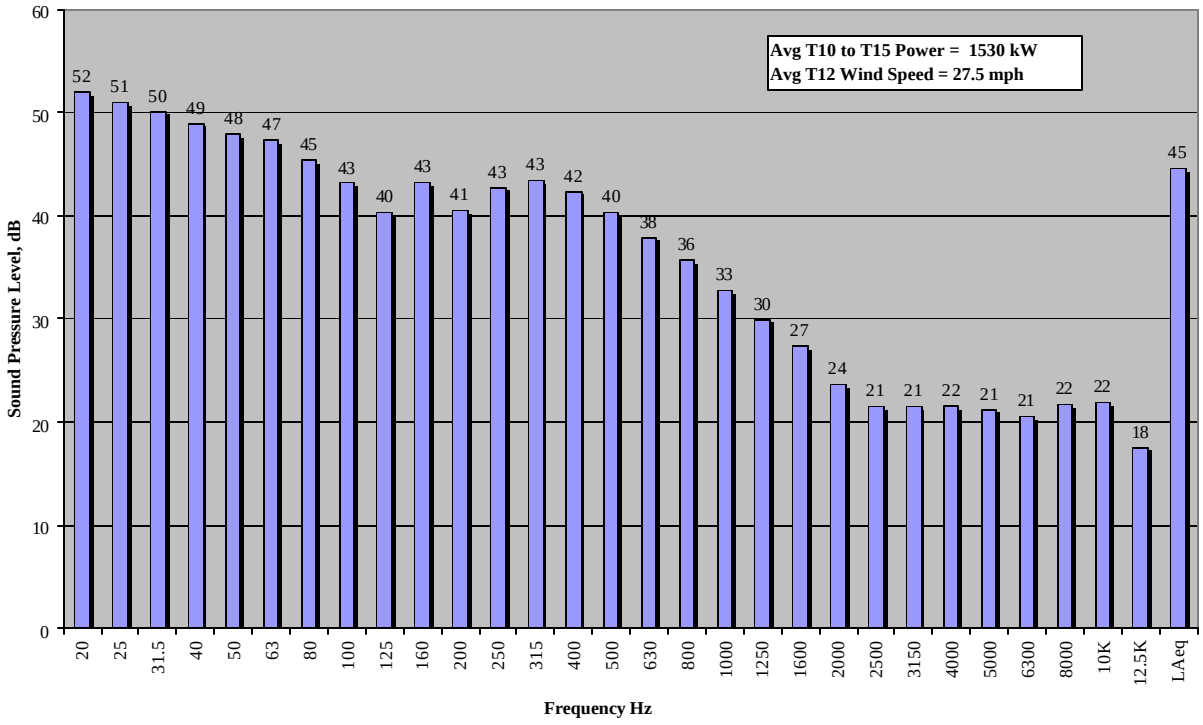
MP-7A
5-Sept-07 00:00 to 01:00



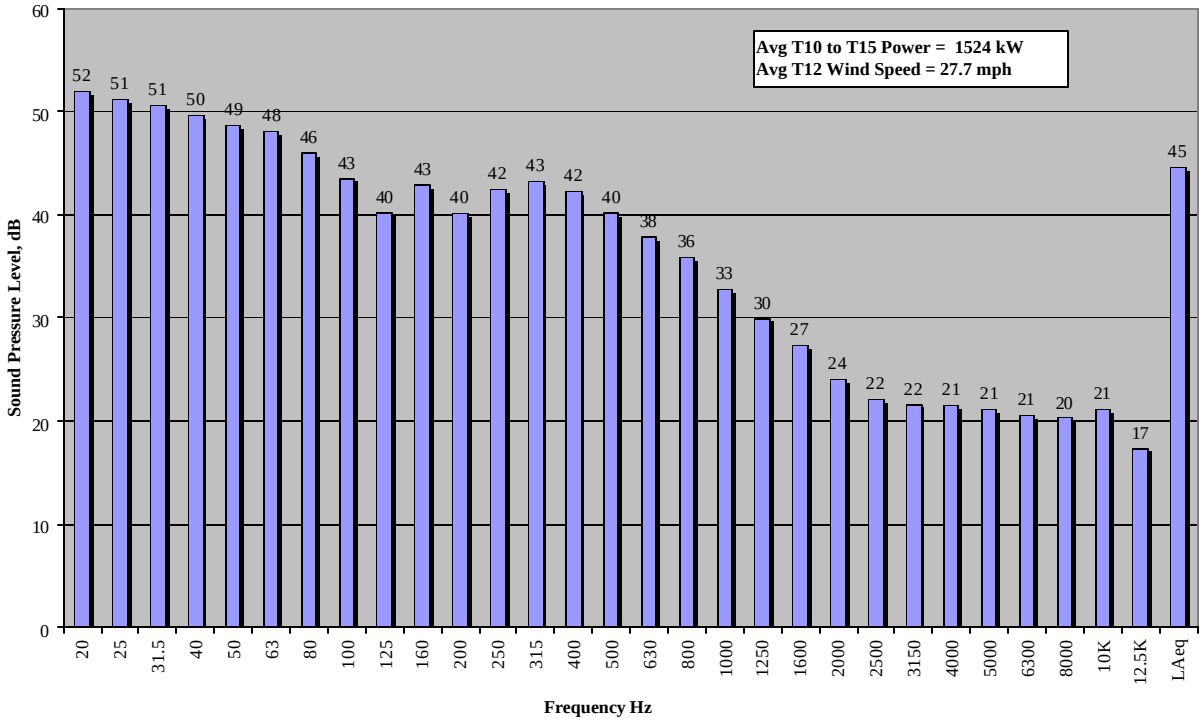
MP-7A
5-Sept-07 01:00 to 02:00



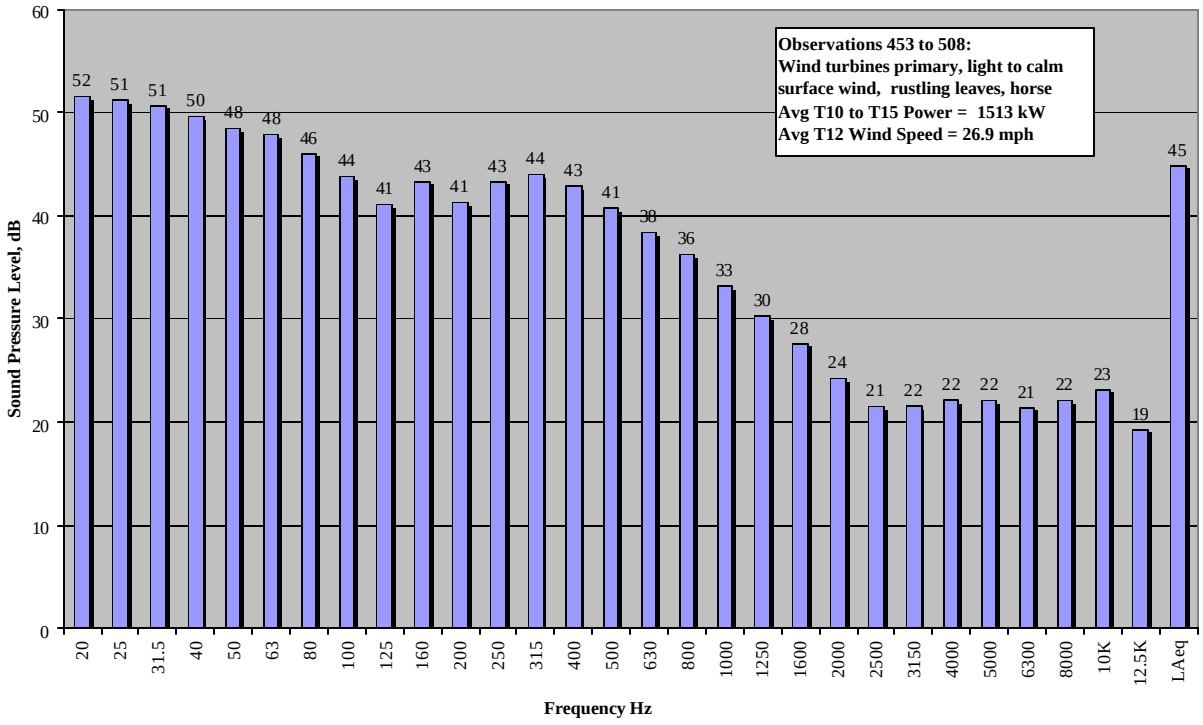
MP-7A
5-Sept-07 02:00 to 03:00



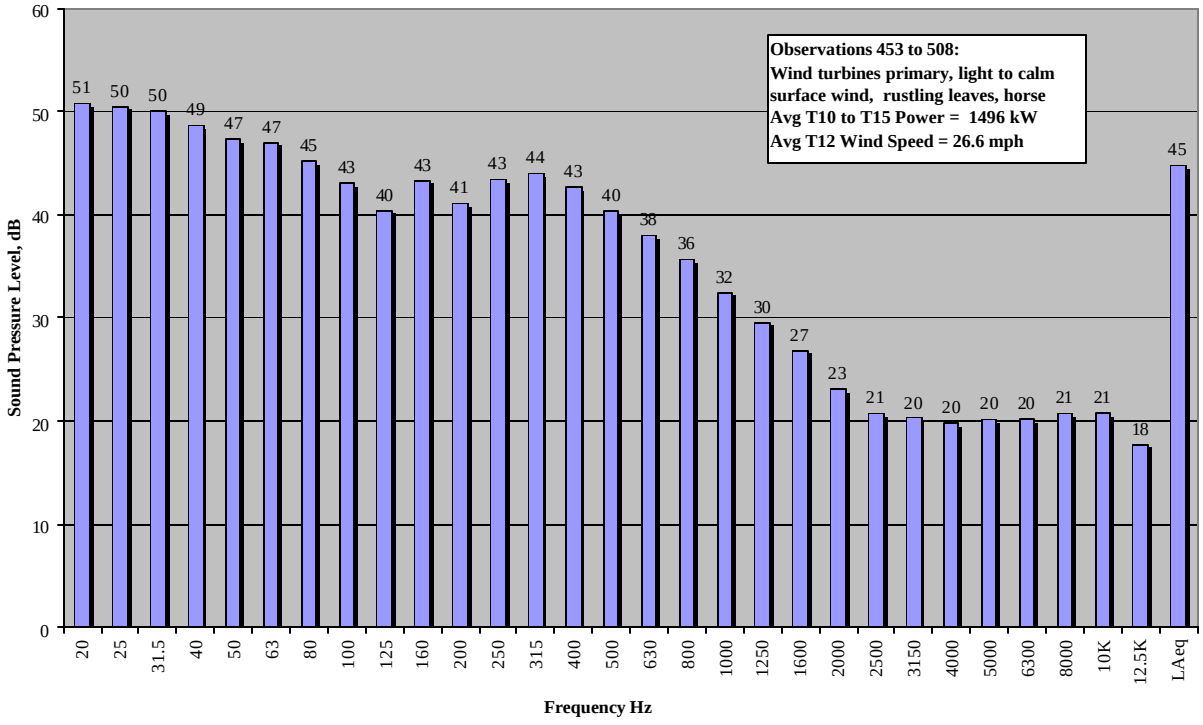
MP-7A
5-Sept-07 03:00 to 04:00



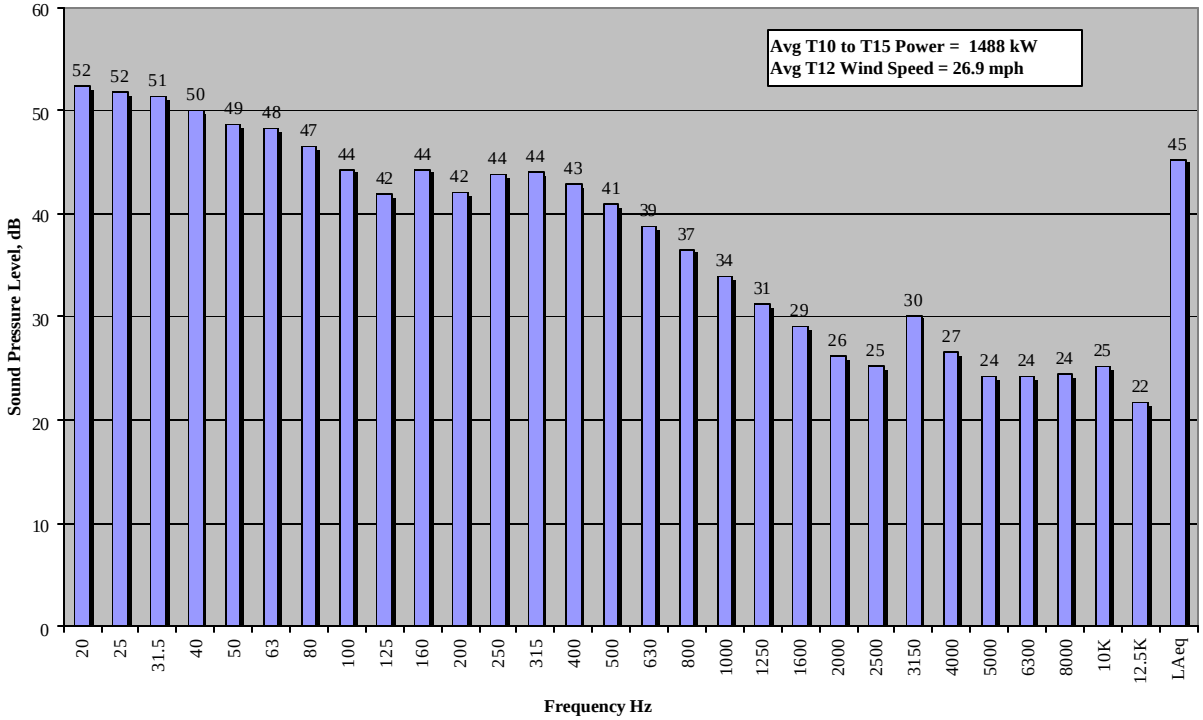
MP-7A
5-Sept-07 04:00 to 05:00



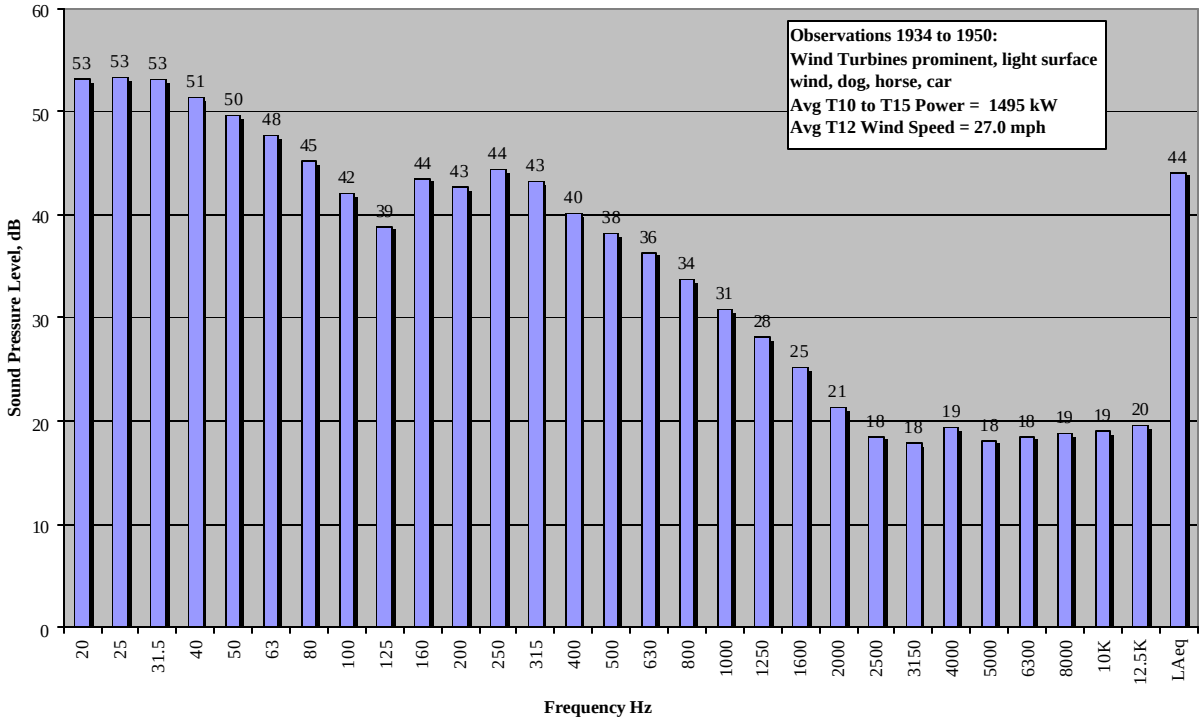
MP-7A
5-Sept-07 05:00 to 06:00



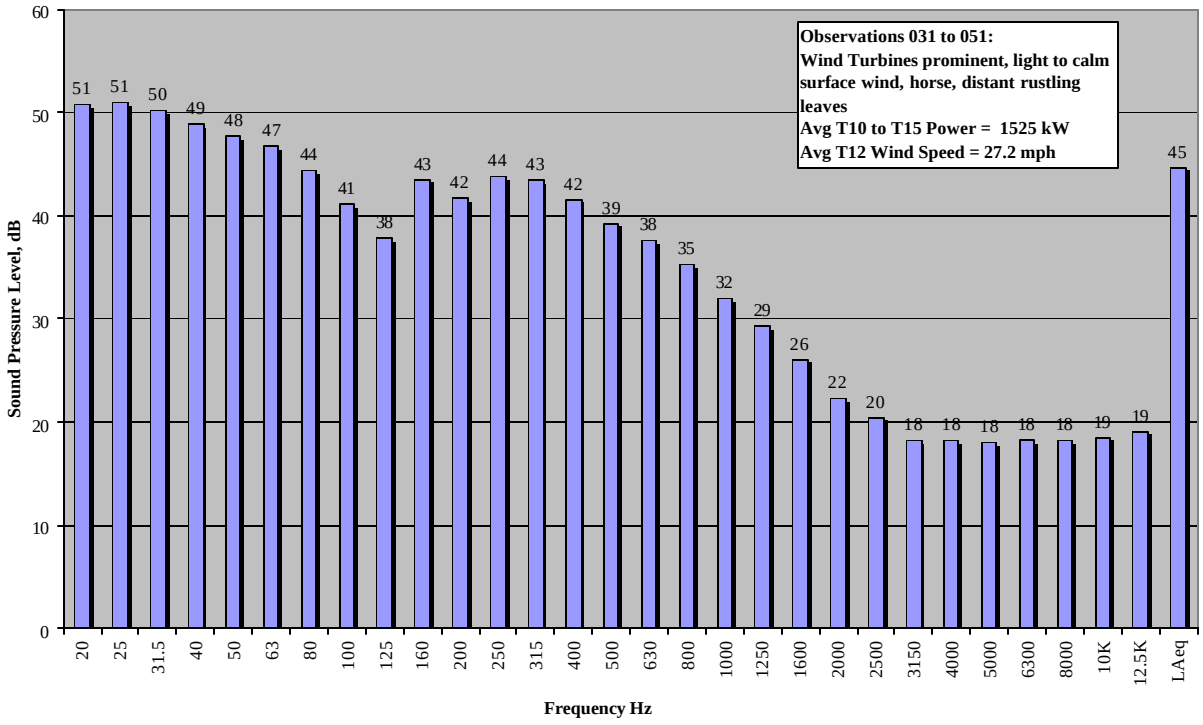
MP-7A
5-Sept-07 06:00 to 07:00



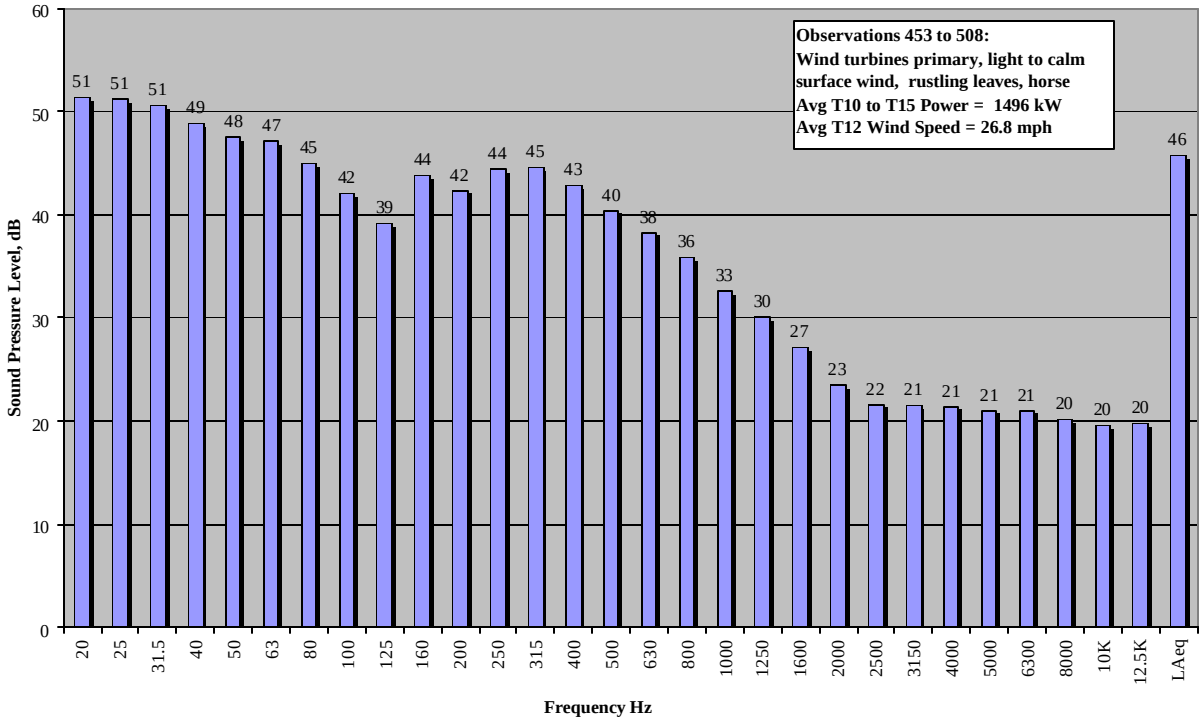
MP-7A
4-Sept-07 19:34 to 19:50



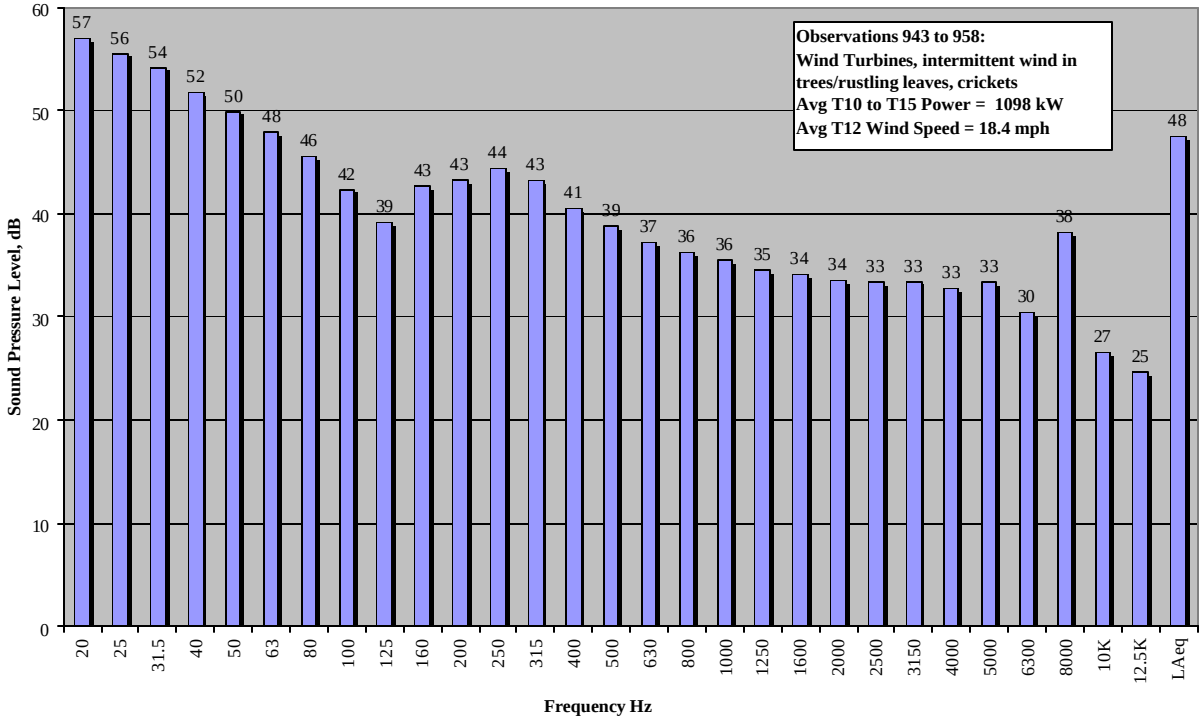
MP-7A
5-Sept-07 0:31 to 0:51



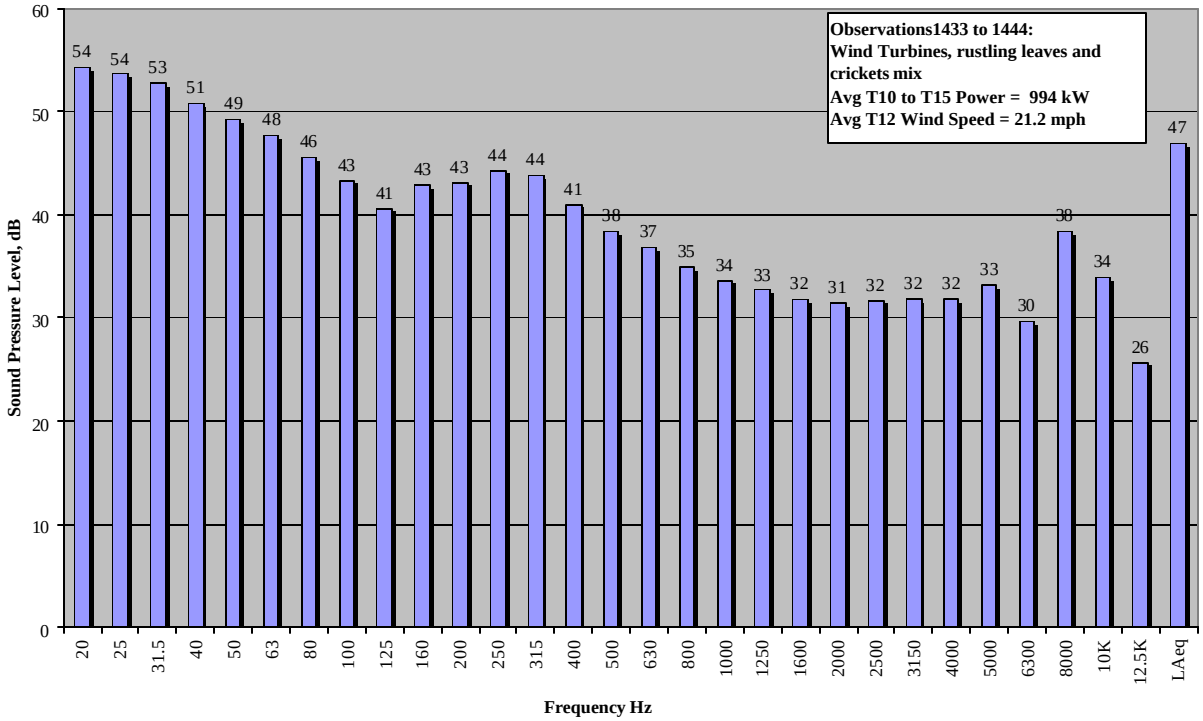
MP-7A
5-Sept-07 4:53 to 5:08



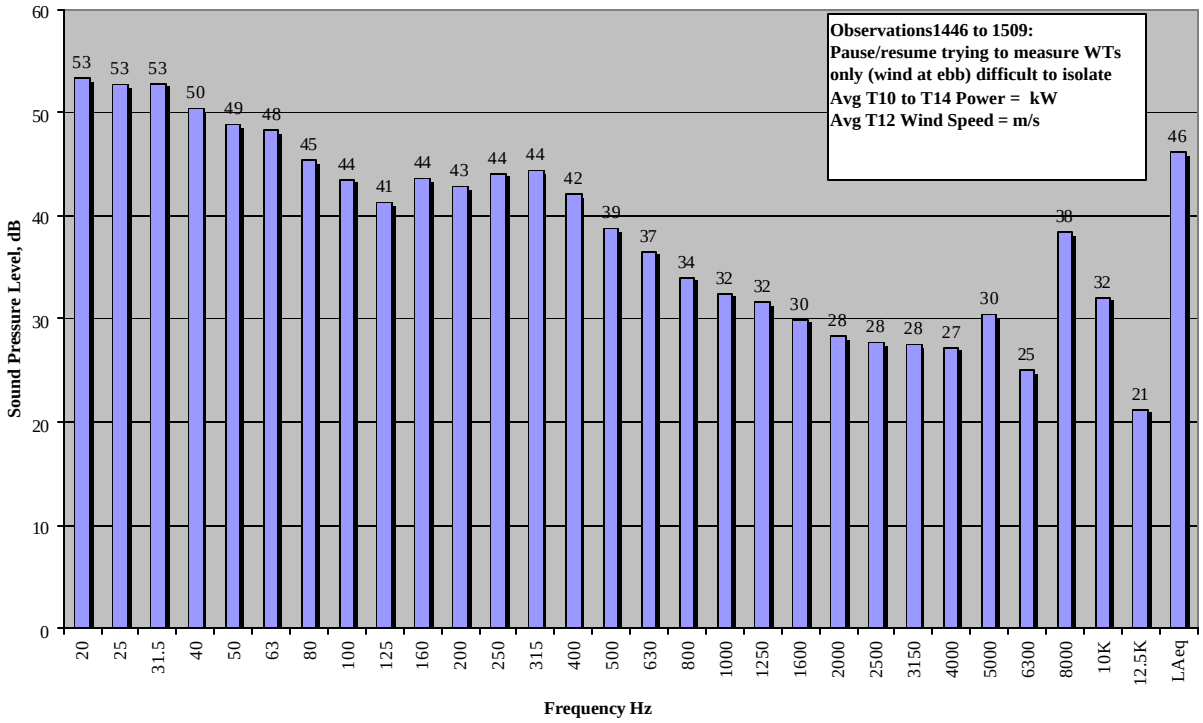
MP-7A
5-Sept-07 9:43 to 9:58



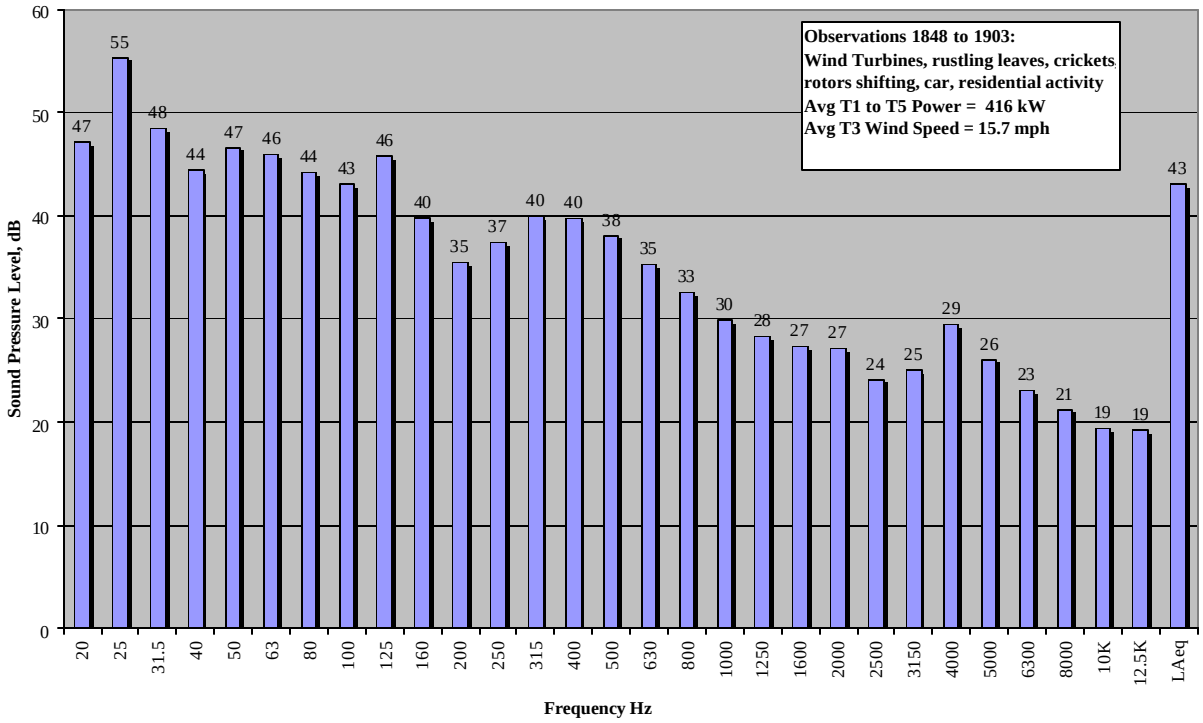
MP-7A
5-Sept-07 14:33 to 14:44



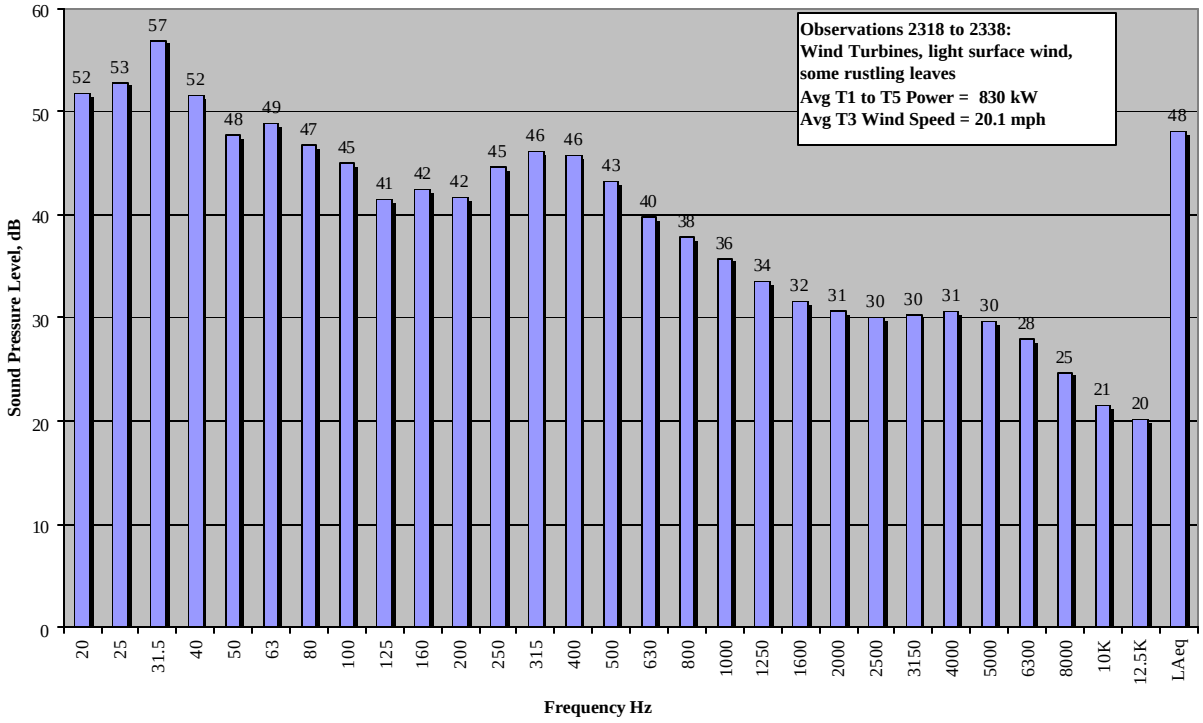
MP-7A
5-Sept-07 14:46 to 15:09



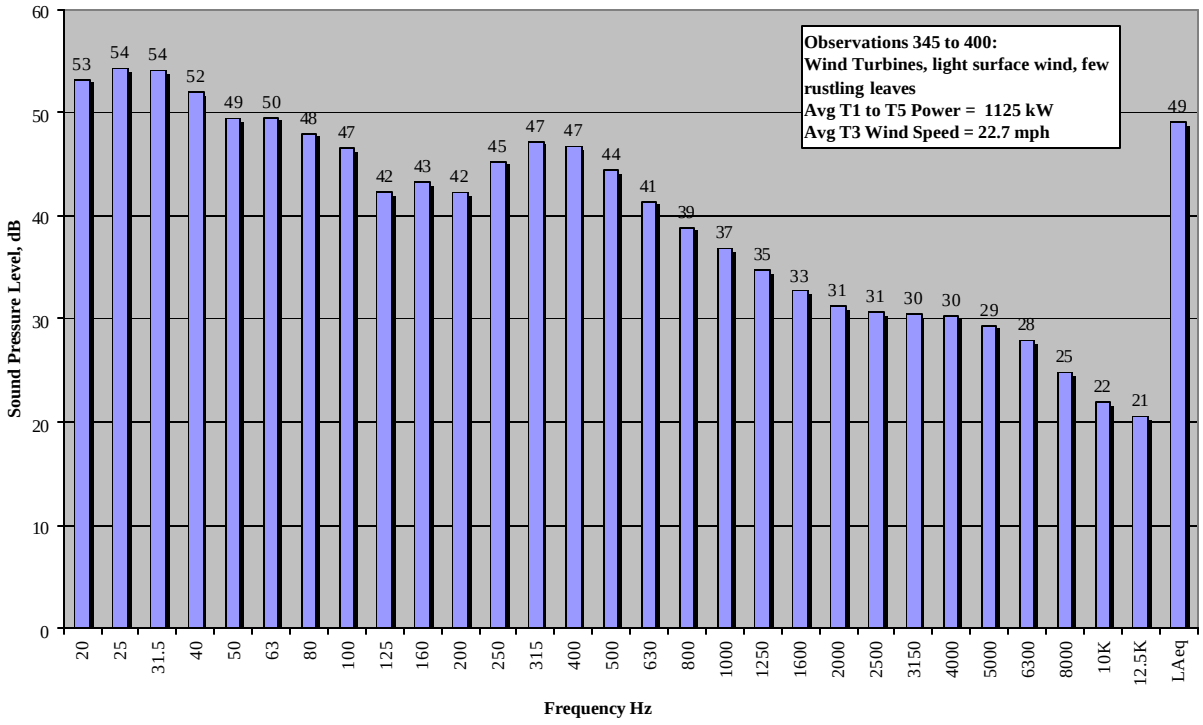
MP-8
4-Sept-07 18:48 to 19:03



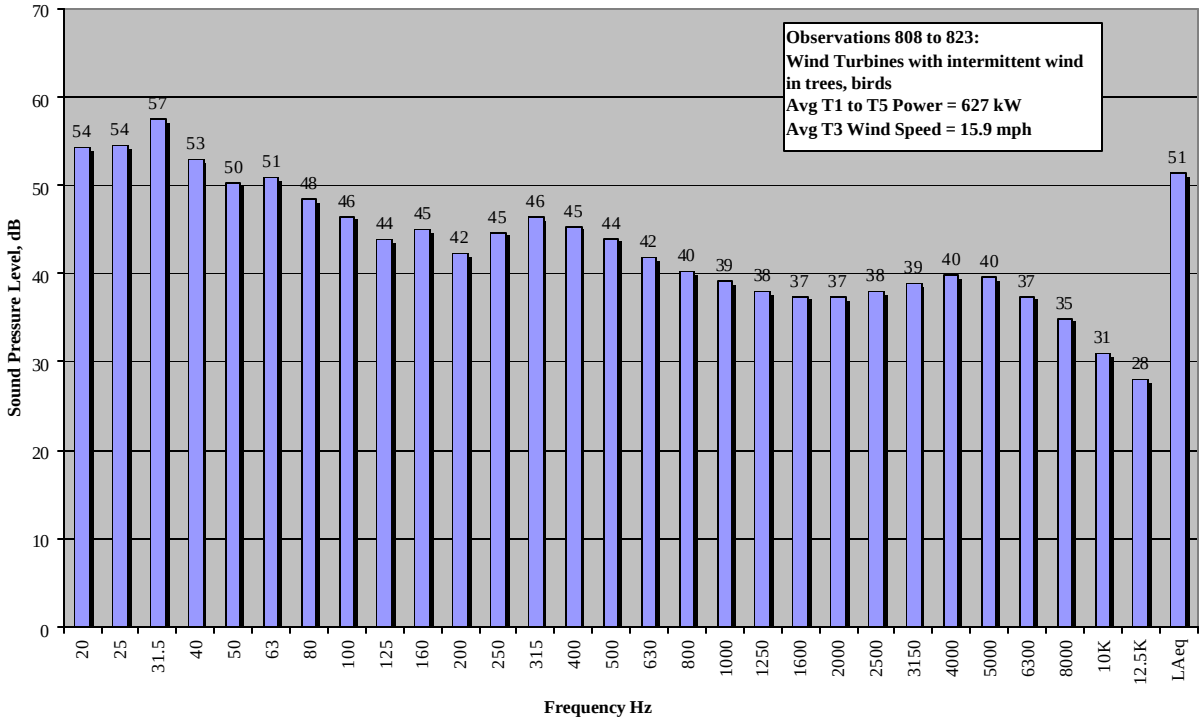
MP-8
4-Sept-07 23:18 to 23:38



MP-8
5-Sept-07 3:45 to 4:00



MP-8
5-Sept-07 8:08 to 8:23



MP-8
5-Sept-07 13:30 to 13:40